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ARCHAEOLOGICAL INVESTIGATIONS, NAVIGATION POOL II, UPPER MISSISSIPPI RIVER BASIN

VOLUME I: NARRATIVE

WAUWATOSA, WISCONSIN

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ARCHAEOLOGICAL INVESTIGATIONS, NAVIGATION POOL 11, UPPER MISSISSIPPI RIVER BASIN

Submitted To: Rock Island District, Department of The Army,
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MANAGEMENT SUMMARY

This report entitled "Archaeological Investigations, Navigation Pool 11, Upper Mississippi River Basin" was sponsored by the Rock Island District, U.S. Army Corps of Engineers under the provisions of Contract No. DACW25-84-C-0014. In part, the investigations fulfill Rock Island District obligations mandated by the National Environmental Policy Act of 1969 (P.L. 91-190), National Historic Preservation Act of 1966 (P.L. 89-665), as amended, Protection and Enhancement of the Cultural Environment (E.O. 11593), Advisory Council's Procedures for the Protection of Historic and Cultural Properties (36 CFR Part 800), Preservation of Historic and Archaeological Data 1974 (P.L. 93-291), and Corps of Engineers Identification and Evaluation of Cultural Resources (E.R. 1105-2-50).

The investigations were undertaken following submittal of a technical proposal in response to a request for proposals. The major work elements of the contract were: (1) a comprehensive literature search with oral interviews; (2) a cultural resources synthesis/overview; (3) preliminary geomorphic modeling; (4) a sample field survey; (5) an intensive survey at selected recreation areas; and (6) an evaluation of the cultural resources in Pool 11 in relation to erosion problems.

The level of investigations was formulated within an "identification" rather than an "evaluation" phase. Thus, archaeological and historic sites were not subjected to evaluation in terms of the criteria for eligibility for inclusion in The National Register of Historic Places. The intent was to provide a sound baseline study to assist in the future management of potentially significant archaeological and historic resources.

Combined methods of auger and coring investigations, test excavations, cut-bank surveys, archives and literature search, remote sensing, and historic mapping procedures have been applied to the development of a preliminary model of landscape evolution. The model addresses the nature, extent, and distribution of buried habitable surfaces in the Navigation Pool. Emphases are placed on the contexts in which sites are known to occur and where they can be expected to occur. In addition, certain limitations of the study are made explicit and recommendations for the resolution of these limitations are presented.

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In conclusion, these investigations have yielded the following: (1) survey of 14 recreation areas totaling 253 acres; (2) survey of 20 linear miles of erosional surfaces; (3) identification of 27 archaeological sites; (4) compilation of a base line cultural resources study for Pool 11 including identification of prehistoric and historic research theries; (5) development of preliminary geomorphic and cultural models; and (6) provided guidelines and recommendations for future study to resolve remaining limitations. Taken together, these data provide sufficient information relating to geomorphic and cultural contexts to identify areas where surficial compliance surveys are inappropriate.

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1. INTRODUCTION:

In April, 1984, Great La.es Archaeological Research Center, Inc. was awarded Contract No. DACW25-84-C-0025 to conduct a Cultural Resource Investigation of Federal Lands in Navigation Pool 11 of the Upper Mississippi River Basin. The award was made following advertisement of the scope of work (see Appendix A) and review of technical proposals in response to that scope (see Appendix B).

Navigation Pool 11 is one of twelve artificial impoundments of the Mississippi River within the Rock Island District created by construction of the locks and dams as part of the 9-Foot Navigation Project. This pool, as indicated in Figure 1, is bounded by Lock and Dam 11 at Dubuque, Iowa on the south and Lock and Dam 10 at Guttenburg, Iowa on the north. This reach of the Mississippi River entails some 32.1 river miles with river mile 583.0 identified as the southern terminus.

There are 3,981 acres above the flat pool under the jurisdiction of the Corps of Engineers and they encompass approximately 312 miles of shoreline. Of this total, the Corps of Engineers controls approximately 170 miles. The U.S. Fish and Wildlife Service manages 105 of the 170 miles. With regard to the 3,981 acres of Corps controlled lands, the U.S. Fish and Wildlife Service has responsibility for managing 3,355 as part of the Upper Mississippi River Fish and Wildlife Refuge. Approximately 250 acres are coincident with recreation areas that have varying degrees of public use.

1.1 Study Objectives:

The cultural resources investigations identified in the scope of work are comprehensive and include multiple objectives which, in turn, were designed to meet future management needs for Navigation Pool 11 for compliance with Section 106 of the National Historic Preservation Act of 1966 (as amended in 1980), erosion monitoring, permitting, leasing, and recreational development.

The following objectives are defined from the scope of work and from the subsequent technical proposal. First, a comprehensive literature and archives search was done to provide a complete inventory and assessment of historic and prehistoric properties on federally owned lands within the pool. The literature search was to incorporate oral interviews, written archival sources, published literature, historic maps, and contacts with appropriate agencies such as the Office of the State Archaeologist of Iowa, the State Historic Preservation Officer of Iowa, the State Historic Preservation Officer of Wisconsin, and the Wisconsin State Archaeologist.

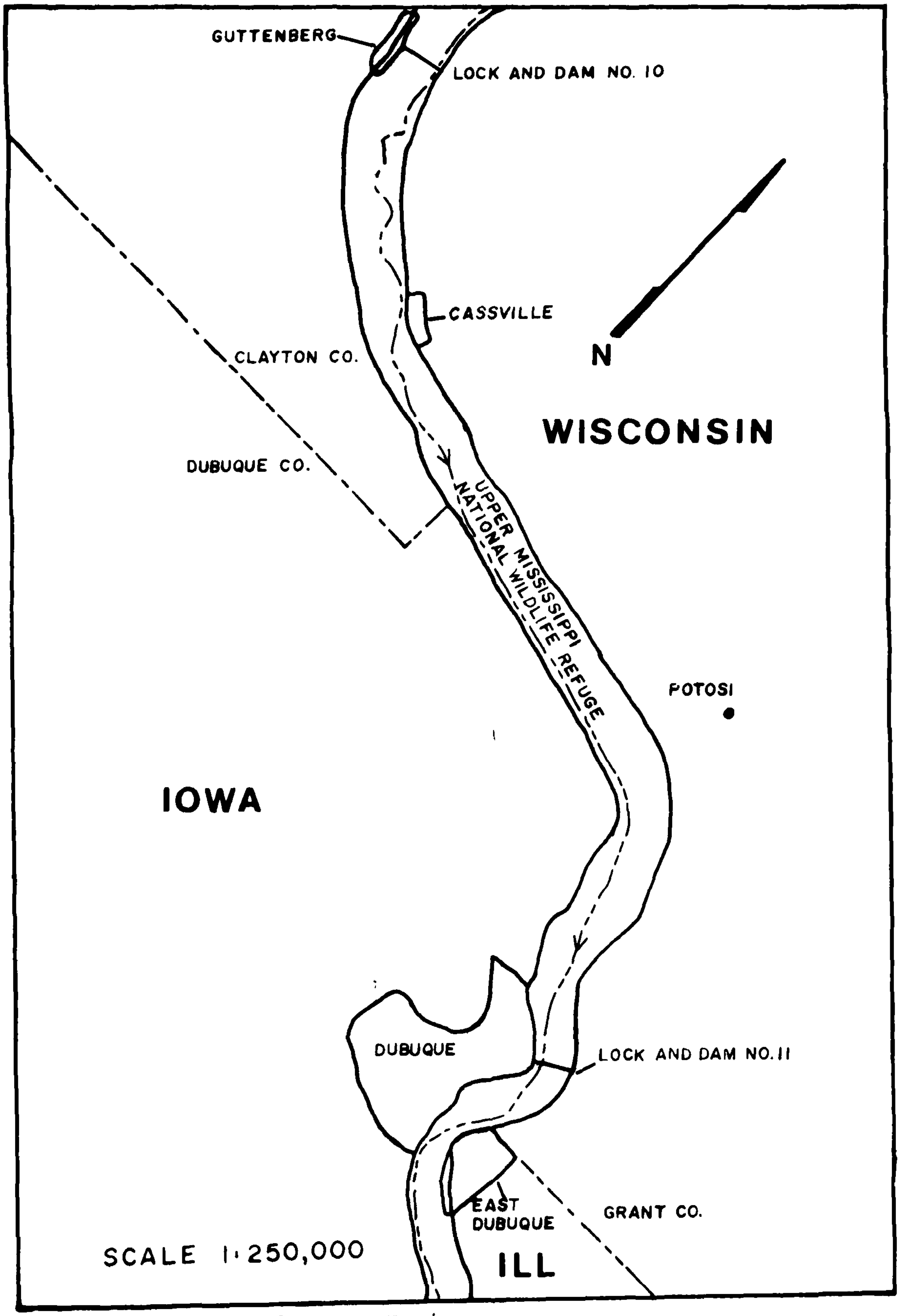


Figure 1: Study Area Environs

Compilation of data during the first objective was to be utilized as the basis for the second objective, the preparation of a cultural resources synthesis and overview for Navigation Pool 11.

Fieldwork associated with these investigations had two additional primary objectives. The first of these was to conduct sub-surface investigations of the pool's surficial geology (fluvial geomorphology) so as to define the "sequence, depth, and extent of soils development" including identification of geomorphic processes and fluvial histories (see scope of work 4.4, appendix A). In addition, a sample field survey was to be implemented to confirm locations of previously reported sites, and, to identify previously unreported site locations. These data, in turn, were placed (as specified in the technical proposal, appendix B), within geomorphic contexts as an aid to the final objective.

The final objective, based on fulfillment of those previously noted, was to establish a preliminary model of floodplain evolution for Navigation Pool 11 integrated with information on both known and suspected cultural resource locations. The utility of a landscape evolution model describing human responses to landscape changes was focused on future management needs and responsibilities. Thus, investigations were conducted at 14 public use areas comprising 235 acres. Four specific requirements addressed as part of the preliminary modeling process included: (1) what data exist, as well as what data gaps exist geographically, temporally, and as guidance for research topics which can be approached through the performance of this and future contracts; (2) what RP3 study needs can be addressed through the performance of this contract; (3) how will data discovered during this contract contribute to our understanding of cultural resources for Pool 11 and the region (descriptive and interpretive); (4) what is the distribution of cultures in the Pool 11 area; and (5) how do geomorphological and ecological data apply to cultural resource investigations for Pool 11.

For the most part, these objectives and their associated tasks were fulfilled. In several instances, however, complete information could not be collected. This was the result of two factors: (1) inundation of past landscapes by the Nine-Foot Navigation Project; and (2) past depth of sediments. While the first factor is self explanatory, the second requires some clarification. Valley fill (Holocene) ranges from 10cm to more than 4.0m in many areas of Pool 11. As a result, we were unable, either with hand-tools or remote sensing techniques, to locate the contact between Holocene and Pleistocene (Late Woodfordian) materials. In many localities, the depth of post-settlement alluvium (post-1850) is so extensive, we were unable to identify the precise depth of the pre-settlement (pre-1850) surface. As an example, at the Turkey River Public Use Area, post-settlement alluvium may be 10 or more feet in depth. In such instances, sub-surface testing obviously could not

be completed. Thus, while we can document the depth of the pre-settlement surface, we were unable to confirm or deny the presence of cultural materials.

Fluctuation in pool levels, a predictable phenomenon that varies each year related to magnitude and duration of spring floods, summer rainfall patterns, and navigation needs, forced irregular scheduling of field investigations. Generally, field work was spread between April and October, 1984. Mr. James Clark, Jr. conducted informant interviews and supervised archaeological survey. Mr. Jeffrey Anderson conducted geomorphological studies. Dr. Ben Richardsen compiled and interpreted the historic maps. Ms. Joan Underwood conducted remote sensing investigations. Mr. Paul Lurenz, Jr., Ms. Sherry Stang, Mr. Paul Koeppler, Ms. Martha Tappen and Mr. James Stark functioned as field and lab crew.

2. HISTORICAL BACKGROUND:

Prior to detailing limitations in the existing data base and summarizing the study objectives and methods by which they were fulfilled, it is appropriate to review previous investigations in the Navigation Pool 11 locality. Early archaeological investigations, classified here as pioneer studies, were generally conducted from the perspectives of natural history. Often guided by the desire to resolve the mound-builder controversy, many of these pioneer studies nontheless provide the only record of now destroyed archaeological sites. The second classification reflects so-called contemporary studies which, in the main refer to specific problem-oriented approaches. Such contemporary studies are further sub-divided into three categories: (1) archaeology; (2) surficial geology and related studies; and (3) those of historical-geographical orientation.

2.1 Pioneer Studies:

Investigations of area archaeological sites began in the mid-19th century when men of letters and scientific curiosity were attracted to the region. The theoretical fuel which fired this interest was the great moundbuilder debate. Intense interest in discovering the origins of a hypothetical superior race thought to be responsible for construction of the many earthworks found on the terraces and blufftops of the Mississippi River was stimulated by attitudes of the time. Natural historians for whatever reasons were reluctant to concede that these prehistoric earthworks were constructed by ancestors of contemporary Indians who were viewed by many in mid 19th century America as indolent and technologically incapable of such endeavors.

William Pidgeon, an apparent avid believer in the ancient race of mound builders began archaeological investigations in the Upper Mississippi River Valley between the

years 1840-1841. Pidgeon's book, published in 1858, entitled "Traditions of the De-Coo-Dah and Antiquous Researches" was widely read during the years following its publication (Mallam 1976a). Pidgeon's interpretations as well as his "empirical" data consisting of mound plats and records could be described as fanciful by contemporary students of Upper Mississippi Valley archaeology. By the late 19th century other natural historians had begun to question the validity of Pidgeon's information and his interpretations of that information.

The Right Reverend Stephen D. Peet, a prolific if somewhat fanciful or romantic writer published many treatises relating to the mound builders and their purported mystical society (1882, 1883, 1884a, 1884b, 1884c, 1884d, 1885, 1887a, 1887b, 1889a, 1889b, 1889c, 1889d, 1889e, 1890, 1891a, 1891b, 1891c, 1892a, 1892b, 1892c, and 1895). Peet publicly questioned the credibility of Pidgeon's conclusions before the close of the 19th century (1882: 55). For a more recent evaluation of Pidgeon's investigations readers are referred to Mallam (1977: 16, 1976a, 159-160, and 1976b: .2).

Theodore Lewis and Alfred Hill, two Minnesota pioneer archaeologists also were caught up in mound builder research. For a period of some 15 years, from 1880 through 1895, Lewis and Hill undertook what became known as the "Northwestern Archaeological Survey." Hill funded the project while Lewis had responsibility for conducting the field work which consisted of platting mounds and mound groups along the Mississippi River between Guttenburg, Iowa and St. Anthony Falls near Minneapolis, Minnesota. Lewis was an accomplished surveyor and his generally accurate maps provide the only record of many sites long since obliterated. Summary comments on the Northwestern Archaeological Survey may be found in Winchell (1911: IX-X), Keyes (1928), and Mallam (1976b: 22-23).

Contemporaneous with the Lewis and Hill surveys were those sponsored by the Smithsonian Institution as part of the work conducted throughout the eastern United States. The Bureau of American Ethnology funded exploration for 10 years with Cyrus Thomas as the general director of the project. Thomas divided the eastern United states into 8 regions or districts, one of which, the Wisconsin District, included the locality of Navigation Pool 11. Agents under Thomas' supervision conducted surveys and extensive excavation and much information relating to mound construction and mortuary behavior was reported by Thomas (1884a, 1884b, 1886, 1887a, 1887b, 1891, 1894, and 1898).

Ellison Orr is another important late 19th century archaeologist who contributed much to the understanding of prehistory in the Upper Mississippi Valley environs of Pool 11. Orr was a native of northeast Iowa who began active fieldwork in 1878 (Orr 1963, Vol VII: 119). By the arrival of the 20th century Orr was actively engaged in the exploration of mounds, open-air habitation sites, and rock shelters

in northeastern Iowa. During these years he amassed a large collection of artifacts, recorded site locations, and mapped mound groups and other archaeological sites (Orr 1913, 1914, 1917a, 1917b).

Somewhat later, Orr published additional reports and prepared a series of manuscripts after joining with Charles R. Keyes and the Iowa Archaeological Survey. The organization was formed in 1912 with Keyes as its director. During the following decade Orr cooperated with Keyes in preparing additional manuscripts relating to survey and excavation of sites in northeastern Iowa and southwestern Wisconsin (e.g. Orr 1927). In 1930, Keyes secured funds to employ Orr on a permanent basis until the latter's death in 1951. During this time Orr completed 12 manuscript volumes summarizing his work in the region. Following his death, Orr's unpublished manuscripts were housed at Effigy Mound National monument and his collections along with those of Keyes were housed at the State Historical Society of Iowa. Recent summaries assessing the value and potential of the Orr-Keyes collections have been provided by Tandarich and Horton (1976) and Tiffany (1981). For a more comprehensive discussion of developments in Iowa prehistory refer to McKusick (1963, 1975, and 1979).

In the late 1800's and almost up until the beginning of World War II, Charles E. Brown, under the auspices of The Wisconsin Archeological Society, initiated a program of archaeological survey and preservation in Wisconsin. While employed at the Milwaukee Public Museum and later at the State Historical Society of Wisconsin Brown communicated with many local avocational archaeologists and published the results of cooperative efforts under the framework of county and local surveys as well as writing many reports describing various phenomena such as ceremonial knives, gravel pit burials, Indian trails, and rock art in Wisconsin. One of the county reports includes Grant County, Wisconsin and describes several sites along the terraces and floodplain of the Mississippi River within Navigation Pool 11.

Perhaps it is not appropriate to classify the work of Keyes, Orr, and Brown as pioneer archaeology. The classification is made here owing to the fact that the primary thrust of their collective work in the region is descriptive and historical rather than integrated within the framework of specific problem orientations. The heuristic value of these archaeological pioneers is undisputed and to eschew these sources in favor of more "scientific" work would indeed be unwise.

2.2 Contemporary Studies:

2.2.1 Archaeology:

By the 1930's the Milwaukee Public Museum, first under the direction of Dr. Sam Barrett and later under Dr. Will C. McKern, had developed a strong field research program. Efforts of survey, excavation, and reporting were directed

in large part to the definition of spatial units of the archaeological record, the development of trait lists, and the identification of cultural complexes. This culminated in the Midwestern Taxonomic Method of Culture Classification (McKern 1939). As part of this research, survey and excavations were carried out at various Grant County sites from Potosi to Cassville, Wisconsin along the Mississippi River (Miller 1932).

Throughout the 1940's and 1950's programs of survey and excavation in Iowa and Wisconsin fluctuated with the availability of staff at state institutions. These fluctuations were the result of such events as World War II, modifications of budget, variation in student populations, and the growth or decline of departments and facilities at area institutions. Sufficient work had been completed, primarily in Jo Daviess County, Illinois to allow for publication of the first regional synthesis by Bennett (1945, 1952).

An important refinement of and adjunct to Bennett's work was completed in 1959 (Logan 1959). As part of his dissertation research Logan conducted survey and excavation of open-air sites, mounds, and rock shelters in the Tri-State (Illinois, Iowa, Wisconsin) locality. Essentially, Logan's comprehensive work set the stage for the identification of Early, Middle, and Late Woodland cultures in the Pool 11 area based on material culture, particularly ceramics. Some attention is given to aspects of Woodland societies relating to mortuary behavior, site distributions as well as site forms, and chronological limits of particular Woodland manifestations. Both data and interpretations relating to settlement and subsistence system reconstructions are quite limited (Logan 1959, 1976).

During the 1960's and 1970's substantial increases in funding levels to support archaeological research and expanded staff and facilities at regional institutions provided new impetus to archaeological investigations in the Pool 11 environs. Programs at the University of Wisconsin-Madison, Luther College, the Office of the State Archaeologist in Iowa and in Wisconsin have continued to contribute to a better understanding of past lifeways along the Guttenburg-Dubuque reach of the Mississippi River.

Mallam's region-specific model of Effigy Mound called for a shift from the delineation of cultural-historical frameworks in favor of research focused on cultural dynamics and culture process (1976). Benn (1978, 1979) has expanded and clarified the Woodland continuum as presented by Logan (1959, 1976). Stoltman (1979) provides a Wisconsin correlation to Benn's work defining Middle Woodland phases for the region.

Survey and testing operations were conducted during the early to middle 1970's by Clarence Geier under the auspices of the University of Wisconsin-Platteville. Relatively intensive archaeological surveys were focused on uplands and terraces along the Wisconsin shore of the Mississippi River between Lock and Dam 11 (at Dubuque) and Cassville (Geier

1974, 1975b, Geier and Loftus 1975, 1976). Investigations were also carried out in the Platte River valley adjacent to the Mississippi River (Geier 1974, 1977, and Geier and Loftus 1975). Excavations were conducted at the Hog Hollow Site (47 Gt 266), a multi-component Woodland site near Potosi, Wisconsin (Geier 1978).

Most recently, investigations in the region have begun to focus on the most poorly known localities in the region--those landscapes associated with the lowland floodplain of the Mississippi River. Survey and testing operations conducted by Great Lakes Archaeological Research Center, Inc. demonstrated significant site burial by Holocene alluvium in pools 12 and 10 of the Upper Mississippi River Basin (Boszhardt and Overstreet 1983, Overstreet 1983, 1984a). Stoltman et al have conducted survey work and test excavations at buried sites in Navigation Pool 10 (1982, see also Boszhardt 1982).

Theler (1983) has reported the results of various excavations in the Pool 10 locality and provided important data relating to Woodland stage utilization of the floodplain. Particular emphases are placed on changes in the exploitation and utilization of fresh water mussels throughout the Woodland cultural sequence.

In both Wisconsin and Iowa studies of upland and terrace environments have been associated with the Great River Road project. Hotopp (1977) in Iowa and Penman (1980, Rusch and Penman 1982, and Ford, Penman, and Knox 1982) have provided substantial new data and important clarifications of sites reported during earlier stages of the development of archaeological methods and techniques.

In summary, much information has been compiled since the last presented synthesis of Upper Mississippi Valley prehistory (Bennett 1952). Much of this more recent literature is summarized in Stoltman's recent broad brush summary of life-ways in the Upper Mississippi valley during the prehistoric eras (1983).

2.2.2 Surficial Geology and Related Studies:

Archaeological studies have demonstrated that the Upper Mississippi Valley with its major landforms of uplands, terraces, and floodplains has been a focal point of human activity for the last 10,000 years. At the same time, it is equally clear that the landscapes noted have been subjected to incessant changes, oftentimes quite radical, while at other times rather subtle. Studies of past climatic shifts, modifications in vegetation and associated fauna, and aggradation and degradation of the landscape are critical to understanding how past populations adjusted their cultural behavior to adapt to new environmental and ecological situations. Some of the more relevant investigations are summarized as they have direct application to this research.

Among the first detailed studies of the specific Navigation Pool 11 environs were those conducted under the auspices of the U.S. Geological Survey. While not concerned

with surficial aspects exclusively, Whitlow and West's map of the geology of the Potosi Quadrangle (1966), and Whitlow and Brown's map of the geology of the Dubuque North Quadrangle (1963) are useful interpretive tools. These maps differentiate alluvial deposits by relative age.

Church (1984) has provided detailed mapping of flood plain alluvial features for Navigation Pool 10 from air-photos and field investigations to confirm landform types and distribution. While the floodplains of Pools 10 and 11 vary in a significant manner, many similarities are noted in the ridge and swale topography. Richard Anderson's geomorphic summary of Navigation Pool 12 (see Boszhardt and Overstreet 1982, 1983, Overstreet 1983) provides additional characterizations of lowland floodplain stability, depositional and erosional environments, and sediment analyses from several locations. Again, the fluvial geomorphology of Navigation Pool 12 is not a mirror image of Pool 11; however, many of the same processes and patterns are recognized in both pools.

Research with regard to landform changes, features, fluvial stratigraphy, changing vegetation patterns, and past climates has contributed to reconstruction of past environmental conditions. Wright, for example, has reconstructed the shifts in the prairie-forest ecotone (1968, 1974a). Webb has investigated climatic trends in the region throughout the Holocene (1980, Webb and Bryson 1972, Webb, Cushing and Wright 1983).

Knox has provided substantial information on fluvial stratigraphy and has correlated stratigraphic units with climatic change in the tributary valleys in the Driftless Area (1972, 1975, 1983, see also Knox, McDowell, and Johnson 1981). These studies have aided in understanding and interpreting the nature and extent of post-settlement alluvium on the Mississippi River floodplain. As well, the rather broad scale climatic trends, based on fluvial stratigraphy, have presented an alternative to models of fluctuation in Holocene climate.

Clayton (1982, 1983) has presented significant bodies of data relating to the influence of glacial lake drainage on the aquatic regime of the Mississippi River. In turn, these episodes of lake drainage have had major effects in forming past and contemporary landscapes. Recently Flock (1983) has attempted to identify specific stratigraphic features, red clay and grey clay deposits, on area terraces and has correlated such features with particular lake drainage episodes.

Jeff Anderson (see Overstreet 1984b) has conducted an in-depth investigation of a small terrace remnant near Potosi. This study has resulted in a better understanding of Holocene instability of Mississippi River terraces and has noted the potential of enriched clay illuvial bands for relative chronology in the region based on the findings of Berg (1984).

Thus, while a major synthesis of floodplain evolution for the Upper Mississippi River is lacking, many recent studies, only a portion of which are cited here, can be applied to problems of interpretation of past land-use.

2.2.3 Historical-Geographical:

Few comprehensive studies of historical-geographical orientation have been conducted specific to the Navigation Pool 11 locality. It is likely that within the coming years historical-geographical studies within thematic frameworks will become more common. In large part this prediction is based on the implementation of the Resource Protection Planning Process or as it is known in C.R.M. jargon, RP3.

In 1980 the Department of the Interior provided State Historic Preservation Officers with a framework or model to develop this resource protection planning process through the formulation of study units or themes which identify historical, archaeological, or architectural contexts. These themes or study units are often compartmentalized into geographic, temporal, or cultural frameworks. Both the states of Iowa and Wisconsin which border the Navigation Pool 11 study area have made substantial efforts in completing this thematic planning process. Henning (1982) has established a series of frameworks for Iowa and a substantial number of themes are completed for Wisconsin. These include Agriculture, Art, Commerce, Education, Government, Historic Native American, Industry, Immigration and Settlement, Planning and Landscape Architecture, Recreation and Entertainment, Religion, Social and Political Movements, and Transportation.

A number of themes have been identified during the course of this investigation derived from previous investigations, from fieldwork, and from consultation with various regional museums, historical societies, and other agencies. At this juncture it is not possible to integrate these themes identified in the overview segment of this report as Iowa and Wisconsin Historic Preservation Divisions have yet to finalize the RP3 documents for those respective states. Nonetheless, the thematic units utilized here can be easily accommodated within the draft categories.

As noted, some geographical studies that apply to the present study area have been completed. Prucha's work on the military frontier, for example, provides the basis for this theme (1953, 1964). Walthall's summary of the aboriginal mining and distribution of Galena represents another broad scale study that has direct application to the Pool 11 locality (1981). Peterson's (1968) investigation of steamboating on the Upper Mississippi River stands as an excellent and comprehensive study of a particular theme (river transportation) with well defined temporal boundaries and is particularly well suited to the RP3 process.

Unfortunately, many historic themes are only poorly represented in the existing literature. Minimal treatment has been given to such topics as Immigration and Settlement,

Agriculture and Milling, Lumbering on the River, and Clamming and the the Pearl Button Industry. These themes and others have been identified and summarized by Overstreet et al for the Upper Mississippi Valley (1983). Also of great utility in identifying and interpreting RP3 themes along the Mississippi River is Rusch and Penman's (1982) report entitled "Historic Sites along the Great River Road." This report includes a sound framework of 19th century history of the Upper Mississippi Valley placed in the context of county histories and is supplemented by excellent photographic records of historic sites and comprehensive map and literature references. Of equal value is the Iowa Great River Road Report (Hotopp 1977a, 1977b).

Owing to a dearth of region-specific and theme-specific studies, it has been necessary to formulate or identify so-called study units for the Pool 11 locality. Prehistoric and historic themes or study units are categorically presented in the subsequent overview section of this report.

3. DATA BASE LIMITATIONS:

Substantial gaps, areas of bias, and other limitations exist in each of the three topical areas: surficial geology and related studies; archaeological investigations; and historical geographical studies. A priori knowledge of these limitations serves to focus research on areas where previous investigations have provided minimal understanding of particular phenomena, assists in evaluating bias in the extant data base, and presents opportunities to refine existing research questions and to conceptualize and define new lines of inquiry.

Several limitations in the extant data base can be identified. These derive almost wholly from logistical problems associated with maintenance of the Nine-Foot Navigation pppject. Following construction of the locks and dams in the 1940's, a significant portion of the landscape was inundated. Thus, many previously reported archaeological and historic sites of potential significance are now submerged. Further, difficulties of access to the floodplain which can only be effectively achieved by boat, fluctuating water levels, and dense noxious vegetation, all have served as a deterrent to post-1940's investigations. The following discussion identifies specific limitations.

3.1 Surficial Geology & Related Studies:

In-depth studies relating to surficial geology have not been attempted for the lowland floodplain of Navigation Pool 11. As a result, prior to these investigations, it was difficult to generalize about the effects of Holocene alluviation for this reach of the Mississippi River. Investigations from Navigation Pool 12 and Navigation Pool 10

immediately south and north of Pool 11 indicate varying degrees of site burial by Holocene sediments, although no specific data were at hand for Pool 11.

Post-settlement alluvium generally has been considered to be extensive for certain environments on the floodplain of the Mississippi River. However, estimates of the depth of post-settlement (post-A.D. 1850) alluvium derive from studies of secondary drainages rather than the main stem of the Mississippi River (see for example Knox 1972, 1975). Thus, while it is relatively well documented as to how secondary drainages responded to increased sediment loads following historic land clearing activities, it is not understood how these events affected sedimentation rates in the Mississippi River floodplain proper.

Because of the lack of specific studies, the major limitations relating to surficial geology or geomorphology of the floodplain of Navigation Pool 11 were: (1) imprecise knowledge of the depth of Holocene alluvium; (2) imprecise knowledge of the depth of post-settlement alluvium; and (3) variations in these depths from one setting to another within the floodplain.

Of additional concern was the lack of understanding of surface stability of various landforms within Navigation Pool 11. Previous soil studies were broadly based and often vague when bottomland classifications were attempted. In fact, most areas of the floodplain and associated low terraces are simply mapped as alluvial soils. In a few instances attempts were made to distinguish "younger" from "older" alluvium (see for example Whitlow and Brown 1963, Whitlow and West 1966). Thus, there is little information regarding soil development, a useful key to surface stability, for any areas of the floodplain.

A last major limitation relates to erosion and redeposition of alluvial materials on various lowland floodplain landforms. A review of historic maps indicates that substantial modifications and fluctuations have occurred during historic times. Comparison of maps dating to the late 19th century, the 1930's, and those from contemporary times (the U.S.G.S. Quadrangles) indicates, for example, that entire islands have been made or lost during this approximate 100 year span. Until this study was completed, however, there was no convenient means to assess, in a detailed manner, the historic modifications of the lowland floodplain landscape.

3.2 Archaeological Studies:

It is not surprizing that an understanding of the distribution of archaeological sites on (in) the floodplain of Navigation Pool 11 is lacking. Even though the limited data from investigations of surficial geology have many gaps, it is clear that site burial on the floodplain is commonplace (Boszhardt and Overstreet 1983, Overstreet 1984a). We know, for example that post-settlement alluvium

in some localities, such as confluence settings, could be measured in 10's of feet. It also was apparent that the contact between Holocene materials and the Late Woodfordian surface was quite deep, in some instances measuring more than 40 feet. Finally, preliminary survey investigations indicated that late prehistoric manifestations (i.e., Late Woodland, Effigy Mound Tradition) were buried by as much as 1.5m of late Holocene and post-settlement alluvium.

To add to this problem, most archaeological investigations in the region, as noted in the previous summary, were restricted to the higher elevations of terraces and bluff-tops. It is clear that investigator bias towards accessible and better drained localities has obscured the true picture of site distribution in the Navigation Pool 11 locality. This has led some researchers to conclude that prehistoric settlement patterns and adaptive strategies were focused on terrace and upland settings rather than on riverine contexts (see for example Geier and Loftus 1975, 1976, Stoltman 1983).

As a result of these limitations, emphases were placed on attempting to relocate previously reported archaeological sites on the lowland floodplain, the discovery of previously unreported archaeological sites on the lowland floodplain, and, most importantly, the geomorphic context of these sites. For example, an historic Fox Village near the confluence of the Turkey and Mississippi Rivers was well documented in the literature. The village, where WohoKeshick or "White Hawk" was born in 1783, was established in that year. The village was visited by Jean Perrault during the summer of 1783 and by Zebulon Pike in 1805, but was deserted by the arrival of the steamboat Virginia in 1823. It would seem likely that a well documented village occupied for more than 20 years would be relatively easy to relocate. However, soil coring at the supposed locality of the village indicates that at least 5.0m of sediments have been deposited since 1850. Granted, this is a rather extreme example, but it serves to underscore the primary reason for the under-representation of historic and prehistoric archaeological sites on the floodplain of Navigation Pool 11 and the seeming abundance of such sites on the terrace and upland settings.

A final limitation remains to be noted--that of limited excavation. While many archaeological sites on terraces of Pool 11 have been subjected to various degrees of investigation, no sites on the floodplain have been systematically investigated. Again, the problems are those of logistics. Archaeological deposits of late Woodland affiliation occur in the floodplain of Pool 11 at 1.50m beneath the present surface. For most of the year that elevation is beneath the water table. Thus, excavation even of a Late Woodland component would likely require dewatering and the establishment of shoring protection for the excavation crew. Such measures are both costly and time-consuming and have served to prohibit or retard critical evaluation of sites on the

floodplain (as an example of floodplain excavations refer to Overstreet 1984a).

In conclusion, access and logistical problems along with investigator bias have resulted in emphases being placed on archaeological sites located on terraces and uplands. Almost no attention has been given to archaeological sites situated on the floodplain. In turn, the availability of information relating to the former and the absence of information relating to the latter, has, in my opinion, influenced interpretations of the regional prehistory. Distortion of settlement and subsistence patterns cannot be corrected until adequate information can be obtained from lowland floodplain contexts.

3.3 Historical-Geographical Studies:

Limitations of Historical-Geographical studies have already been noted. Primary limitations include a lack of region-specific studies with the exception of such well documented topics or themes as historic lead mining, riverboat navigation, and river commerce. Until more specific studies are conducted relating to lumbering, immigration and settlement, and agriculture and milling, interpretations of sites relating to such themes will have to be based on broad scale studies. This limitation is temporary in nature. Following completion of the resource protection planning process, interpretation and evaluation may be based on the defined study units. As some state RP3 plans emphasize chronology while others focus on geographic subdivisions there will be some variation in interpretation and evaluation. Nontheless, the plans will provide for establishing an historic context for each study unit as well as defining the data and integrity levels required for National Register eligibility evaluations of specific sites or properties.

4. GOALS AND OBJECTIVES OF THE CURRENT INVESTIGATIONS:

Based both upon evaluation of the existing data base limitations and on specific management needs identified in the scope of work (Appendix A), a research design was submitted in response to that scope (Appendix B). Specific objectives were set forth for each topical area and are identified below.

4.1 Surficial Geology:

As stated in the SOW, one of the requirements of the procurement governing these investigations was to provide identification and definition of the sequence, depth, and extent of soils development. As an adjunct to these tasks, geomorphic processes and fluvial histories were to be considered. Finally, the relationship between cultural

resources and specific landforms was to be evaluated with an assessment of resources destroyed due to erosion and inundation, and, an evaluation of the number and types of cultural resources remaining for management.

To meet these requirements, a variety of subsurface investigations were planned. These included coring and auger investigations throughout the pool, remote sensing investigations in specific habitats, inspection of vertical exposures or other erosional environments, and hand excavation. The various investigations also included the collection of soil samples from depths ranging to about 20' below the present surface for sedimentological, chemical and microscopic analyses. Locations of investigations were determined in part by immediate management needs, e.g., the investigation of special use areas identified for potential future development, by topographic setting, from historical features derived from pre-lock and dam maps, and at the locations of identified archaeological sites.

In the most general sense, based on investigations conducted in Navigation Pool 10 and 12 (Overstreet 1984a, Boszhardt and Overstreet 1983), we sought to determine the depth of historic and prehistoric site burial. In order to fulfill this specific objective it is necessary to identify, _in situ_, diagnostic archaeological materials which can be relatively dated to secure estimates of site burial.

A second set of general objectives relate to refining our understanding of the evolution of the lowland floodplain in the pool 11 reach. Experience has demonstrated that it is very difficult to generalize regarding sediment depth in the Upper Valley. Factors such as the gradient of the river bed, bedrock constraints, location of tributaries with differing sediment loads, and particular aquatic regimes all work in concert to obfuscate time-depth relationships. Pool 11 is notable in this respect as it is situated downstream from the mouth of the Wisconsin River which carries a large volume of coarse sediment.

Thus, subsurface investigations were carried out at approximately 30 locations in the Navigation Pool. The majority of these were conducted in the upper two-thirds of the pool because of the significant inundation in the southern one-third. Specific objectives were: (1) identification of the depths of Holocene sediments; (2) identification of the depths of post-settlement alluvium; (3) assessment of past surface stability and soil development; and (4) depth of historic and prehistoric site burial.

Previous studies (Whitlow and Brown 1963, Whitlow and West 1966) had already demonstrated that in many localities we would not be able to observe the depth of the contact between Holocene and Late Woodfordian sediments. Nonetheless, we believed that in relatively stable landform situations it would be possible to identify that contact within 15-20 feet of the present surface. Realization of this objective would provide several useful tools. First, we would be able to determine, in selected locations, the

depth of the Holocene matrix and thus, the depth of now buried landscapes that could potentially have been occupied by past populations. As well, by analyses of the cores we would be able to investigate relative stability of past surfaces. Finally, at archaeological site locations where datable materials were recovered in undisturbed contexts we would be provided with opportunities to provide interpretations of the evolution of the floodplain with sediment chronologies.

The extent of post-settlement alluvium (post A.D. 1850) has been demonstrated to be extensive in tributary valleys (Knox 1972, Knox and Johnson 1975). It has been determined that post-settlement alluvial depths on the Mississippi floodplain are quite variable (Church 1984, Overstreet 1984a) ranging from 10's of feet to less than 1 foot. Fortunately, in the driftless area, the physical and chemical properties of post-settlement alluvium make it relatively simple to differentiate from earlier sediments. Fulfillment of this second objective, to identify the depths of post-settlement alluvium, is an important concern for lowland floodplain archaeological survey. In some localities in Pool 11 the depth of post-1850 deposits exceeds 20 feet, in others it is quite limited and the pre-1850 surface is within 2-3 feet of the present surface. Obviously, current methods and techniques of archaeological survey generally preclude the definition of potentially significant resources situated 20 or more feet below the present surface.

To conduct inventory in these alluvial contexts is at best unwise. In fact, where recent surficial deposits are extensive, compliance inventories are unreliable and should not be conducted. Finally, the definition of the relative depths of post-settlement alluvium is useful in reconstructing historic modification of the floodplain environment.

The floodplain is an incredibly complex mosaic of different aged surfaces. In some localities there seems to be an almost constant state of fluctuation throughout the Holocene and almost no soil development can be identified. This derives from constant accretion of sediments and in part from turbation. At other locations, long-term stability is identified by rates of soil development. In still other situations unconformities exist. In few instances is there a meaningful relationship between contemporary surfaces and buried topographic features.

The fourth objective, to determine relative depths of historic and prehistoric site burial, presents equally complex problems. Given that the depth of different aged surfaces varies extensively, the depth of site burial should be equally variable. This was borne out in fact. For example, an intact Late Woodland hearth with an associated Madison Cordmarked vessel was found at a depth of 1.50m below the surface. On terrace margins, Archaic materials are found at or near the surface. In the deeply buried Turkey River

bottom, a Fox village dating to A.D. 1783 underlies more than 20 feet of post-settlement alluvium.

The realization of these objectives demonstrates that any predictive model has significant limitations. The sample size upon which the model is developed is statistically invalid and clearly meaningless. Understanding of the matrix at any location on the floodplain is a prerequisite to any attempt to conduct cultural resources inventory. And, significant additional work will have to be conducted before a comprehensive model of floodplain evolution can be presented.

4.2 Historical Geographical Study Objectives:

One of the major objectives of these investigations was to conduct a comprehensive literature and archives compilation. As noted in the scope of work, this compilation was to consider published and unpublished literature, map sources, and oral sources, i.e., local collectors, property owners, former property owners, state and local historical society members. The anticipated volume of information was extensive. As a result, a second objective was to reorganize the information in a data file system including annotations, bibliographic references, and map locations.

Following establishment of the data file, the results of this task were to be summarized in narrative form which represents a synthesis/overview for Navigation Pool 11 and the surrounding environs. The desired framework for the narrative overview was both thematic and specific. This format was designed so as to assure reasonable integration within the prehistoric and historic study units of the resource protection planning process in Iowa and Wisconsin. As these study units are presently in draft form and subject to modification in both Iowa and Wisconsin, efforts were made to conform as closely as possible to existing study units exclusive of either geographic or historical orientations.

4.3 Archaeological Survey Objectives:

Given the nature of the environment and the unknown number of historic and prehistoric sites recorded in published and unpublished literature and those derived from oral sources, the requirements for the archaeological survey in the SOW were purposefully flexible:

> The contractor shall generate and implement a field survey to confirm cultural resource locations cited in documents and to identify previously unrecorded sites that will require management decisions. The field sampling strategy will include a definition of the study area through the use of available mapping (including aerials), the description and display of project

lands in terms of field coverage, and the description of geomorphological and environmental data pertinent to past cultural use (see Scope of Work, Appendix A).

In addition to pool-wide investigations, 14 special use areas were to be investigated. The purpose of these site-specific investigations was to identify and assess cultural resources that will have to be considered during recreational development and management planning.

A third objective was dove-tailed with those of surficial geology. It was our intent, following confirmation of previously reported sites to focus on erosional environments, primarily cut-banks, to identify near-surface archaeological deposits. Once these had been encountered, through soil coring, auger investigations, test pitting, and remote sensing, we hoped to confirm the presence of deeply buried sites as had been accomplished in Navigation Pool 10 (Overstreet 1984a). Generally, this objective was frustrated by high water levels, significant amounts of post-settlement alluvium, and our inability in most instances to reach surfaces of sufficient age with hand tools. As a result, while Archaic and PaleoIndian components were identified on terrace settings, no sites pre-dating Woodland eras were found on the floodplain of the Mississippi River. This is interpreted as a function of extremely small samples of this three-dimensional environment and not a reflection of actual pre-Woodland site distributions.

Much dialogue has been directed to appropriate sampling procedures and adequate sample sizes. While such dialogue and commentary is undoubtedly germane to two-dimensional environments, it has little relevance to the lowland floodplain of the Mississippi River. We did not, for reasons that seem obvious, attempt to secure a valid "probability" sample. Brown, while addressing problems from a single site perspective has cogently noted the folly of such endeavors:

> Sampling within buried occupational layers (or strata) in a stratified site is clearly a different problem than sampling over an exposed surface. All probabilistic sampling procedures assume that the total surface of the site is equally accessible. But superposition of sample populations imposes difficulties that rule out probabilistic sampling procedure in any realistic research design (1979: 163-164).

Although this comment is directed to the unique problems of a single, deeply stratified site, the applicability to the Mississippi River floodplain is clear.

Thus, this archaeological survey is clearly biased to particular localities where, in concert with the appropriate first step of "collecting of information relevant to the number and distribution subsurface archaeological zones" (Brown 1979: 165), information could be most effectively

secured. As Brown further states: "This is the information that would be recoverable prior to excavation from such opportunistically available sources as erosional cuts, topographic/geomorphic information, and intentional sources such as coring" (1979: 165). In conclusion, the overall objective of the archaeological survey was to secure information from both geomorphic investigation and archaeological data to formulate a testable, preliminary model of archaeological site distributions within the matrix of the Navigation Pool 11 floodplain.

4.4 Preliminary Predictive Models:

Information sets from surficial geology and related studies such as past climate, bog and pollen profiles, and fluvial stratigraphy were integrated with data derived from archives and literature investigations, archaeological excavations and archaeological survey to meet the final objective of the investigations. Utilizing this information we sought to develop a preliminary model of landscape evolution for the lowland floodplain of the Mississippi River in Navigation Pool 11. This is not to suggest that we were attempting to present a comprehensive statement of archaeological site distributions. The nature of the floodplain and our current understanding of the nature and form of buried sites precludes such an attempt. Rather, we sought to secure data that would allow for predictive statements, general in nature, regarding the locations of buried surfaces and hence, the potential depths at which archaeological sites could be expected to occur.

As indicated in the proposal (Appendix B) submitted in response to the SOW, this model had several goals. First, we desired to provide a geomorphic and fluvial history of the Navigation Pool environs. Second, we wished to expand upon the known data base regarding the vertical and horizontal extent of different aged alluvial matrices as identified on contemporary and historic geological survey maps. A third objective was to identify differential depths of the Pleistocene (Late Woodfordian)/Holocene interface. A fourth major objective was to identify through cut-bank surveys, core and auger investigations, and remote sensing, a series of correspondences between archaeological deposits and buried surfaces. Fulfillment of these objectives would provide the bases for development of a predictive model, a model which would address a series of depositional contexts of relative ages. Given the relative ages of these contexts, in large part consisting of buried surfaces, we could anticipate where archaeological sites could be expected to occur.

The predictive model is viewed as the culmination of the investigations and has two purposes. The first of these is pragmatic and related to management needs. For example, the public use areas are likely to be subjected to earth moving activities associated with recreational developments.

If archaeological sites could be expected to occur in near-surface contexts, management responsibilities of evaluation and, if necessary, recovery would have to be considered. In some locations, however, the depth of PSA is significant, comprising tens of feet of calcareous silts. At these localities, the geomorphic contexts facilitate cultural resources management decisions. It is clearly unnecessary to conduct inventory relying on surficial techniques when pre-1850 surfaces are situated 20 or more feet below the present surface.

The second element of the predictive model functions as a guide to future research. Quite clearly, efficient and effective survey operations on the floodplain will have to be biased to take advantage of fluvial stratigraphy. We would not for example wish to undertake archaeological survey on the Turkey River bottom to identify Archaic habitations. At that location even the pre-settlement surface is beyond the reach of such endeavors. As an alternative, test excavations or other methods of locating early and middle Holocene habitations should be deployed in localities where significantly less Holocene and historic period alluvium has been deposited.

In conclusion, the model is designed to provide for predictions of where such contexts will occur, and provides the means by which such contexts can be identified and verified in the field and laboratory. There can be no serious doubt that deeply buried sites of middle to early Holocene age are situated on buried surfaces in navigation Pool 11 floodplain contexts (Overstreet 1984a, Church 1984). The application of an evolutionary model of the landscape is an important first step in confirming, and, at a later date evaluating pre-Woodland floodplain sites. However, it is also clear that while the model serves to significantly reduce the volume of the haystack, the needle is still quite difficult to find. The development of a sound geomorphic model significantly narrows the focus of the search.

5. INVESTIGATIVE METHODS AND RESULTS OF INVESTIGATIONS:

Differing methods, techniques, and procedures were applied to geomorphological investigations, archaeological survey, archives and literature compilation, and interpretation and modification of historic maps. Upon completion of these tasks, information sets were integrated to present a working data file for future management and research use, to develop an overview of Pleistocene and surficial geology, prehistoric, and historic occupation and utilization of the Navigation Pool lands, and, to develop the predictive model of landscape evolution that serves as a guide to future archaeological and geomorphic investigation in the region. These methods, and the subsequent results of their application are reviewed for each of the major tasks.

5.1 Literature and Archives Search:

As a first effort in the literature and archives search, published literature, unpublished master's theses and doctoral dissertations, correspondence and other information files, unpublished research manuscripts, serial publications, and many other information sources were consulted and reviewed. References relevant to history, prehistory, geology, geography, and related topics in the project area were incorporated in a bibliographic file. Totaling more than 600 entries of information of use for management and research purposes, the compiled bibliography is attached.

Annotations were recorded and placed within the context of specific sites. These annotations are recorded on Pool 11 site forms which are bound in Volume II, Archaeological Data File, of the report.

Historical cartographic documents were also investigated. The bibliography includes the cartographic references in a categorical framework which is referenced by general region specific state (Iowa or Wisconsin), county, those restricted specifically to the Mississippi River, and fire insurance maps for various towns, villages, and cities in both Iowa and Wisconsin.

Area newspaper files from Burlington, Cedar Rapids, Clayton County, Des Moines, Dubuque, Fennimore, Guttenburg, Platteville, and Lancaster were surveyed for articles providing insights into historic and prehistoric sites and activities. Eleven significant articles ranging from topics such as the pearl button industry to steamboating, lumbering to centennial celebrations were recorded. Of particular interest are some of the early tintype renditions and other historic photographs.

Seven manuscript collections were identified, but, because of the volume and specific nature of these collections they were not thoroughly examined. Rather, these collections are summarized and listed in the bibliographic references. For example, the Dewey-Massey-St. John collection of deeds and contracts from 1830-1906 are housed by the Archives Division, State Historical Society of Wisconsin. This collection includes transections of Nelson Dewey, Henry L. Massey, Willis St. John and their heirs relating to mines, mineral rights, and related activities. As such, the manuscript file represents a potentially fruitful source for specific historical inquiry into the development, spread, and ultimate decline of the lead mining industry in the so-called lead region.

A second example is the George B. Merrick correspondence file housed at the Wisconsin State Historical Society Archives Division and the Area Research Center at La Crosse. Merrick's file includes clippings, steamboat invoices, articles, and card indexes of steamboats and steamboat officers. The collection spans the years 1838-1934 and

represents an important source for study specific to the historical development of transportation.

Interviews were conducted with many individuals from state and local units of government, private citizens from the immediate study locality, and others removed from the region, who had been identified as potentially important sources of information relating to the history and prehistory of Navigation Pool 11. Interviews were conducted at Mineral Point, Madison, Platteville, Potosi, Lancaster, and at various rural locations along the Mississippi River in Wisconsin.

In Iowa, informants were visited in Des Moines, Iowa City, Dubuque, Garnavillo, Guttenburg, and various rural localities along the Mississippi River. Finally, an important source of information, the Corps of Engineer archives, was reviewed with personnel from the Rock Island District, Corps of Engineers at Rock Island, Illinois. A list of informants is provided in the bibliography.

Area Research Centers at Loras College, Dubuque, Iowa and at the University of Wisconsin-Platteville were important sources of historical data. County and local historical societies including those at Strawberry Point, Dubuque, and Garnavillo in Iowa and at Potosi and Platteville were visited and their collections reviewed. Public libraries of 11 municipalities or state institutions were also a significant source of published and unpublished data. Museums in Platteville, Dubuque, Cassville, and Guttenburg were visited and their collections assessed with reference to the study topics. Finally, Nelson Dewey State Park at Cassville, Wisconsin and the Turkey River Mounds State Preserve were also visited for sources of information.

The archives and literature search resulted in a compilation of approximately 80 historic sites and 100 prehistoric sites. Comprehensive data sheets were completed for each site and are found in Volume II of this report. The procedures of data organization are given greater attention in a subsequent discussion.

5.2 Historic Mapping Procedures:

Two sets of historically important maps were chosen for scale conversion and the construction of mylar overlays. The Mississippi River Commission maps were made during the years 1893-1894 following the first major navigation improvements on the river and represent the best rendition of prelock and dam topography and vegetation. The Brown Survey, conducted from Hastings, Minnesota to Grafton, Illinois, compiled topographic maps immediately prior to the construction of the 9-foot navigation project during the years 1929-1930. The former maps are constructed at a scale of 1:20,000 while the later were drawn at a scale of 1:2,000. The mapping procedure was designed to rectify and calibrate these scales to the 1:24,000 scale of contemporary U.S.G.S. 7.5' quadrangles.

Conversion was first attempted through the use of a Map-O-Graph (Trade names are for the convenience of this reader only. Neither RID-COE or GLARC, Inc. endorse cited products). Spherical abberation, however, resulted in unacceptable distortion and associated problems of scale and accuracy. Further, the light intensity of the Map-O-Graph was insufficient for interpretation of fine detail, particularly of the Brown maps when reduced from a scale of 1:2,000 to 1:24,000. A Kail Reflecting Projector (KRP) was used effectively to produce the desired uniform scale conversions. The KRP differs from the Map-O-Graph in that the former consists of a horizontal (as opposed to a vertical) flat-bed drafting surface. All optics of the KRP move in a horizontal position, and the object screen and reflected image are mounted flush with the drafting table-height working surface. The original maps were placed image-side down on the object glass. The reflected object is transferred to the image glass by means of a series of coordinated first-surface mirrors and moveable, high quality bellows extension lenses. A control panel is mounted on the side of the KRP and one control operates scale conversions while another controls focus. By means of these controls, the scale of the object map can be brought into an exact second scale and sharply focused. The following procedures describe the cartographic process:

a) The first step in the cartographic process was to carefully transcribe the detail of the USGS topographic maps onto Keuffel and Esser one-surface frosted Herculene. A border was constructed around each traced USGS topographic map corresponding to the exact longitude and latitude borders of each map for complete registration purposes. In addition, section lines, township and county borders, and other cadastral lines were traced in order to provide accuracy in registration.

b) The original maps were matched precisely and attached one to the next in a series by drafting tape. Linear detail was thus assured as the maps and portions of a single map had to be moved across the object plate so that the proper area could be matched to the image of the original map projected onto the image glass plate. The image was made visible by the frosted Herculene.

c) The traced USGS quadrangle sheets were placed on the image plate, one at a time. An exact reproduced scale of the original maps to the USGS maps was determined by using needle dividers and by manipulating the scale and focus controls of the Kail projector. These controls are driven by electric motors. A braking device on each control prevents "floating" when the control switch is released. In this way the scale of the original maps was precisely matched to the scale of the 1:24,000 topographic maps.

d) Each segment of the original map viewed on the Herculene drafting medium on the image plate was traced. The tracing procedure consisted of using a magnifying glass to see the precise detail projected onto the image plate. The projected features of the original maps were traced directly onto the Herculene drafting surface with a reservoir 00 Leroy pen and nib. If errors occurred in the tracing-inking stage (and they did), the errors could be corrected and/or altered by use of a dampened plastic eraser in an electric erasing machine. New lines were reconstructed directly over corrected areas because on Herculene (or any other mylar-base drafting surface) the ink lays on the surface and does not penetrate into fibers.

e) As the drafting-to-scale proceeded, each completed segment was checked against the preceding drafted segment for registration. At the scale conversion size used, the Kail produced only a small section of each individual original map. There was no problem with misregistration because the original map sheets and the traced USGS topographic sheets were matched and taped together after the scale was adjusted and prior to drafting. Furthermore, registration was constantly checked against section, township, and latitude and longitude lines.

f) When the Commission Map series was completed the Herculene sheets were overlaid on and registered to the actual USGS maps on a light table. It was felt that the accuracy of the finished product was good because outlines of islands in the river and bluff lines along the valley coincided to the corresponding features on the topographic quadrangles.

g) The Brown Maps were processed, scaled, and drafted in the same manner as the Commission maps. Work with the Brown Maps was more difficult because the change in scale from 1:2,000 to 1:24,000 reduced detail to the point that it was difficult to see features on the image plate, even with a magnification glass. In some cases it was necessary to color the Mississippi River channel on the original maps in order to distinguish the river from closely spaced contour lines at the original scale of 1:2,000.

h) The final verification of accuracy of the final drafted maps was to register them to each other and to the topographic maps. All features fell within professionally acceptable limits. Where they did not, the maps or portions of the map were redrafted. The errors were attributed to human error and/or machine calibration.

Adhesive patterns or screens were not placed on the final, scaled maps because this would mask detail when the maps were overlaid on each other or on the topographic maps. The value of these scaled maps is that the scale of the Commission and Brown maps were defined to each other and to the USGS maps. When superimposed without adhesive patterns or screens, the detail of the land at two previous time periods can be registered to the modern topographic maps. These overlays can be quickly utilized to denote lands made or lost since the late 19th century. The management applications for cultural resources are two-fold. First, landforms developed since the late 19th century will obviously not harbor prehistoric sites, and second, changes in landforms can provide insights to relative rates of erosion and deposition at various locations on the floodplain. Figures 2, 3, and 4 present representative samples of the overlays. Figure 2 depicts the late 19th century configuration superimposed on the contemporary topography. Figure 3 portrays the 1929-1930 configuration contrasted with that of present times. Figure 4 presents changes in landforms between the late 19th century and the 1920 Brown Survey. Mylar originals have been forwarded to the Rock Island District, U.S. Army Corps of Engineers. Copies may be obtained from that agency (environmental division).

5.3 Data Files:

Site specific information derived from archives, literature search, and informant interviews, and, from field investigations, was compiled on site survey data sheets which comprise Volume II of this report. Cultural resources identified were placed either in a historic or prehistoric category. In turn, these categories were then organized by state, county, and township. Specific provenience, where established by field reconnaissance or other means, was recorded both by legal description and Universal Transverse Mercator coordinates. Additional information relating to location was included such as topographic features, geomorphic context, potential for destruction (i.e., site being actively eroded, protected, destroyed, etc.). Finally, the basis for determination of the site, e.g., private collections, informant interviews, archive research, remote sensing, coring, surface collection, was also specified.

Archival sources were referenced on the data sheet and an annotation was provided. For example, the annotation for Lock and Dam 11 is as follows:

> One of the 26 locks and dams built on the Upper Mississippi River during the 1930's for navigation purposes. Lock and Dam 11 was constructed under two separate contracts. Work commenced on the locks on February 5, 1934 and was completed on August 22, 1935. Construction of the dam consisting of 13 tainter gates, 3 roller gates, 1,564

Figure 2: Late 19th Century topography, imposed on Turkey River 7.5' U.S.G.S. quadrangle.

Figure 3: 1929-1930 topography superimposed on Turkey River 7.5' U.S.G.S. quadrangle.

Figure 4: Changes in topography, late 19th century-1929 (bold line denotes 1890's landforms, dotted line is 1929 landscape).

> feet of non-overflow earth dike, and 1,976 feet of highway fill was started on September 10, 1935 and finished on May 15, 1937. It cost the government $6,935,000.00 to build (Rosean 1969: 50, U.S. Army Corps of Engineers, Rock Island District 1982, 1984a, Potosi Township Historical Society, n.d. #37).

A townsite, gristmill and sawmill on the Little Maquoketa River is identified as follows:

> Chester Sage and Brayton B. Bushee established the first sawmill in Dubuque County and the second in Iowa here in 1833. Buhrs were added the following year for grinding corn and other grains. Townsite laid out here. A post office was established at Sageville in the 1840's but was discontinued during the Civil War (Goodspeed 1911: 487-488; Peterson 1941: 80-81; Mott 1973: 521; Edwards, Greenough, and Deved 1866; Andreas 1875: 38; Western historical Society 1880: frontspiece; Trygg 1964: Sheet 1, Iowa series).

The annotation from an unconfirmed prehistoric campsite reads as follows:

> Campsite shown on the Brown Atlas in this general vicinity. Possibly the workshop (47 Gt 30) described as being located at Cassville, on slightly elevated land above the Cassville brewery on Furnace Branch. No Wisconsin Archaeological Codification File number has been assigned to this site (Brown, n.d.).

The entry for 47 Gt 31 notes:

> Two mounds excavated. Human remains, many stone implements found. Also skeleton with great quantity of copper ornaments. Geier (1975) reports these mounds destroyed (Webster 1887: 599-600, Geier 1975; Geier and Loftus 1976: 58-129; C.E.B. Atlas, n.d., S.H.S.W.).

For site 47 Gt 270, the following annotation is provided:

> Cultural materials from the site include a lanceolate projectile point with incurvate base, expanding stemmed projectile points, Madison Side-notched point, decortication and processual flakes, shatter, lead, bifaces, and mollusc shells. Site covers 3-4 acres. A marked soil discoloration accompanied artifact scatter suggesting greater humus content and tendency for more rapid draining. The Brown Atlas shows a campsite and a

modern Indian cemetery at this location (Geier 1974: 1; Geier and Loftus 1975, 1976, C.E.B. Atlas, n.d. S.H.S.W.).

Each site in the data file was assigned a Map Code number and the recorded site location was then plotted on the appropriate U.S.G.S. Quadrangle. Finally, sites located during the course of these investigations that yielded cultural materials have a supplemental sheet (lot check list) which serves to summarize cultural materials collected from the sites.

Site forms and data sheets are bound within a 3-ring binder so that as additional data are brought to light, existing data sheets can be easily updated. In addition, previously unrecorded sites can be integrated within the data file and added to the base maps for pool 11 as they are encountered by future investigations or by informants.

Photographic records were made for sites that were confirmed by field reconnaissance. An archive storage holder for each site is appended to the data file. Finally, supplemental data in the form of a lot-check list are integrated within the file for each site where cultural materials were recovered during the field investigations conducted by Great Lakes Archaeological Research Center, Inc.

5.4 Summary:

A substantial body of baseline data were compiled during the course of pre-field research and field investigations. Synthesis of the baseline data are provided in two separate formats. The first of these is an historical overview of the prehistoric and historic sites and locations now identified for Navigation Pool 11 and the immediate surroundings. The overview is intended to represent a concise synopsis for each major division or theme for which we have adequate information.

The second aspect of the synthesis is the integration of cultural information with the geomorphic investigation results. This aspect is presented in the form of a "predictive model" which indicates the known and suspected depths of the three major stratigraphic units of the floodplain: (1) the Late Woodfordian surface; (2) the Holocene sediments; and (3) the post-settlement (A.D.1850) alluvium. Where identified and confirmed, archaeological sites within these units are noted.

5.5 Archaeological/Geomorphological Survey:

These aspects of investigation were often combined in our attempts to secure adequate information to develop a preliminary landscape evolution model. Together, the field investigations consisted of four primary investigative techniques: (1) Surface investigation of erosional environments

(cut banks) and cultivated or other exposed areas, and exposure profiling; (2) Coring and auger investigations; (3) excavation tests (both archaeological and soil pits); and (4) remote sensing investigations. Laboratory analyses consisted of chemical and microscopic analyses of sediments, cleaning, cataloging, and functional analyses of artifacts recovered from archaeological sites.

5.5.1 Field Investigations:

5.5.1.1 Surface Investigations:

More than 20 miles of erosional surfaces were inspected in Navigation Pool 11. As indicated on base maps appended to this report (see Plates I-III), surface investigation was restricted largely to the upstream head and lateral margins of islands and along terrace margins where substantial exposures exist. In many instances, owing to fluctuating water levels in the pool, it was necessary to visit localities on more than one occasion. Access to perhaps 80-90% of these localities can only be secured by boat.

Surface inspection consisted of walking the exposed foreshore which varies in extent with the water level in the pool and observing the surface for the presence of cultural materials. Following the identification of artifacts on the foreshores, or in a few rare instances within the cut bank or network of tree roots, attempts were made to determine the in-situ position of cultural materials.

5.5.1.2 Subsurface Investigations-Coring and Excavations:

For the majority of locations, sub-surface investigations consisted of coring and excavation of profiles (cut-banks) or excavation tests. Identification of the geomorphic context was accomplished by either cleaning the cut bank with shovels and trowels, evaluating and recording the stratigraphy, or, by investigating the locality with silt probes (Oakfield tools) and bucket augers. The silt probe, given an appropriate matrix, is more quickly utilized. However, silt probes often cannot penetrate coarse sediments and a 3" diameter bucket auger was utilized. Depths of these investigations ranged from approximately 5-20 feet. As each increment was removed, the matrix was inspected and recorded on a calibrated boring log. Observation was made with respect to grain size and other textural features, color recorded from a Munsell color chart, and the core or auger matrix was inspected for the presence of organic material, cultural debris, or other foreign matter. Conditions of matrix and access vary greatly. We estimate, however, that each core extraction and description requires about .5 man days to accomplish.

In some instances, excavation units were dug for the combined purposes of clarifying stratigraphy and securing a larger sample of cultural materials. In these instances,

unit size was restricted to 1m x 1m test units. Matrix was either carefully troweled or passed through a hand screen of 1/4" mesh.

As a first interpretive step, the depth of post-settlement alluvium was recorded. In turn, this often dictated survey strategies applied subsequent to the determination. If only a thin veneer of post-settlement alluvium was deposited on the pre-settlement surface, excavation tests would be feasible. However, if post-settlement alluvium exceeded 5 or more feet, this indicated that the pre-settlement surface was generally below the water table. The Holocene matrix-the potentially habitable surfaces-often comprised an additional 20 or more feet, at which point the contact between Holocene and Late Woodfordian materials would occur. Again, the focus of the combined archaeological-geomorphological investigations was directed to identifying surfaces and depths of different aged alluvium and not on identifying archaeological sites. In many instances we were fortunate in that late prehistoric or historic sites were encountered and thus served as chronological baselines to date surficial sediment deposition. Twenty-seven general localities were subjected to sub-surface investigations. These locations are depicted in Figure 5.

5.5.1.3 Geomorphic and Pedologic Investigations of the Pool 11 Sites:

Geomorphic and pedologic information about the Pool 11 sites was obtained from a variety of sources. A number of topographic maps were incorporated into the site evaluation process. The Mississippi River Commission maps produced in 1893 with 5 foot contour intervals provided information concerning the nature of the Mississippi Valley prior to the lock and dam impoundment. The Brown survey maps produced during 1929-1930 also provided additional information prior to river impoundment. Topographic maps with 2 foot contour intervals produced by the Corps of Engineers in 1943 were an additional source of information. These maps were of particular use in delineating discrete differences between alluvial landforms. The final set of topographic maps used was the U.S.G.S. 7.5 minute topographic quadrangles.

In addition to topographic maps, air photos provided valuable information regarding the identification of alluvial and historical features within the pool. Three sets of air photographs were used in this survey. One set was produced during October 1940 and provided information early in the pool development. A second set was provided from October 1961. Unfortunately, these two sets only provided complete coverage for the upper end of the pool north of Jack Oak island. The third set was provided by the Corps and has complete coverage of the pool during the flood of April 1965.

The most important source of information used in the project was on-site field studies conducted during June,

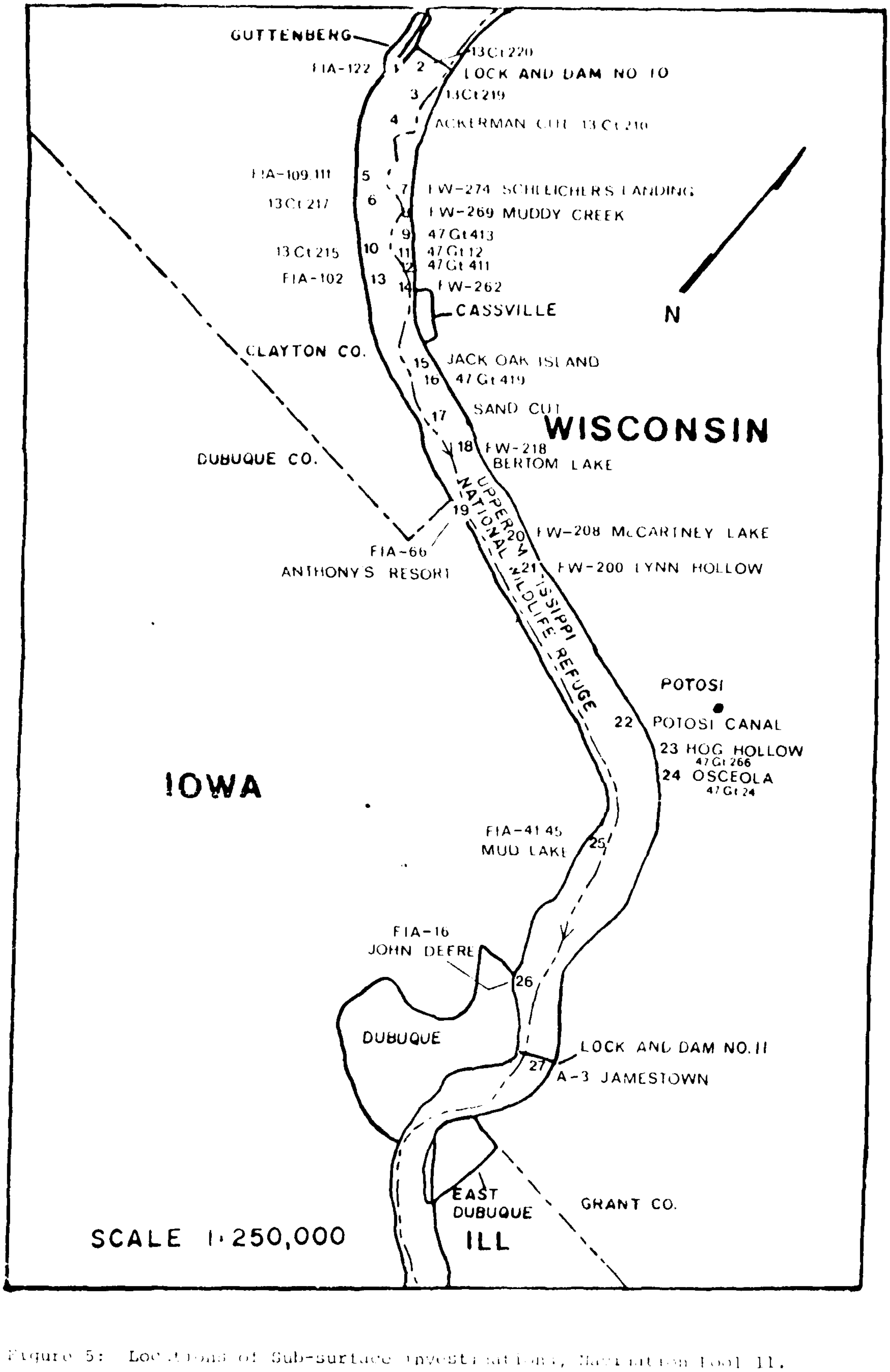


Figure 5: Locations of Sub-surface Investigations, Navigation Pool 11.

July, August, and October 1984. These studies included the use of coring tools, block excavations, soil pits, and photographs, and applications of ground penetrating radar (GPR).

The most complete information was obtained through block excavations and soil pits. Block excavations were performed at Grant River Public Use Area while soil pits were dug at sites whenever possible throughout the pool. However, most of the profile information was obtained through the use of the silt probe which often provides reliable information about the stratigraphic column.

Problems inherent with the silt probe include the compaction of low bulk density horizons (particularly former surface A-1 horizons) which tends to bias the vertical extent of the unit. Structural attributes of soil horizons which reflect the degree of soil development are difficult to recover from the probe, particularly below the water table. In addition, swelling from saturated expandable clays tends to impede downward progress through the column and contaminate the profile. In contrast, the probe will often recover samples from depths greater than 3 meters if the textures are neither too fine nor too coarse. Although deep cores greater than 3m can take hours to extract and describe, the probe is considerably faster than digging soil pits, or using the bucket auger.

The 3" diameter bucket auger was used whenever possible in the pool study. The auger recovers relatively large quantities of material ideal for sampling. Although some mixing of the profile occurs, the large diameter of the auger will often preserve some of the structural attributes of the soil horizon or stratigraphic unit. Due to the large auger diameter, however, deep penetration through the soil and alluvial units seldom occurred. In addition, use of the auger proved much more time consuming compared to the silt probe.

Complimenting the field studies of the pool was the limited use of simple lab techniques. This included microscopic identification of sediments and the testing of sediments for carbonates. Petrographic identification of the sediments was important because the probable origin of the material could often be determined. For example, sediments stored in the pool throughout the Holocene are generally leached of carbonates, and may contain well rounded granitic, and basaltic sand, granules, and pebbles of glaciofluvial origin. Historical (post European settlement) deposits mobilized from the tributary watersheds and deposited along the valley margins of the pool are often characterized by a relatively high proportion of angular carbonate fragments. The identification of historical sediment is crucial when determining the degree of archaeological site burial by historical alluvium.

Because of the need for site-specific information relating to management concerns for special use areas and identified archaeological sites, geomorphic and pedogenic

summaries are presented in various sections of this report. For example, a summary of the field work, geomorphic setting, and interpretations of these data is integrated within the discussion of each special use locality. As well, at each archaeological site identified during the course of the investigations, soil profiles, description of pedogenic and geomorphic processes, and relevant interpretations are discussed within the context of each site. This organizational framework will allow cultural resource managers to quickly evaluate each location to determine the need for future efforts related to proposed special use area developments or other activities coincident with known archaeological sites. Broad-based interpretations derived from the study at 27 localities are integrated with remote sensing and archaeological survey data in the predictive model presentation.

5.5.1.4 Remote Sensing (GPR):

Remote sensing was conducted at three localities on the floodplain of Navigation Pool 11 (Figure 5). Instrumentation utilized for these investigations was a ground penetrating radar unit, an SIR System 8 manufactured by Geophysical Survey Systems, Inc. This system consists of a control unit, transducer (radar transmitter, receiver, and antenna), a graphic chart recorder, and a magnetic tape recorder. The unit operates on 12 volts D.C., which, in this case was supplied by a portable generator.

Radar transducers operating at different frequencies and wave lengths can be used with this equipment. In general, lower transducer frequencies will yield greater depth of penetration of the radar signal, while higher frequencies, although not able to penetrate the earth as deeply, provide the higher resolution. The higher frequency transducer is able to discriminate between more closely spaced objects and interfaces. The antenna used for this investigation operates at a center frequency of 50 megahertz. This transducer provides adequate depth penetration while maintaining good near surface resolution.

In operation, a brief pulse (measured in nanoseconds) of electromagnetic energy is directed into the ground. When this energy encounters an interface between two materials of differing dielectric properties, a portion of the energy is reflected back to the transducer. The reflected energy is received by the transducer and processed within the control unit where it is amplified and the time differential between the initial transmission of the electromagnetic pulse and the reception of the reflected wave is determined. The electromagnetic wave travels through the medium at a velocity dependent upon its dielectric characteristics, so the time differential can be converted into vertical scale or depth beneath the ground surface. This only requires knowledge of the dielectric constant of the medium, or, more commonly, on site determination of the depth of a visible radar target. The electromagnetic pulse is repeated at a rate of 50 kilohertz and the resultant stream of radar data

is sent to the chart recorder where a continuous hard copy profile of the data is produced as the transducer is moved along the ground surface.

Horizontal controls are marked at known increments on the ground. As the transducer is moved past these known increments, a mark is transmitted to the chart by the operator of the transducer or the radar technician. Thus, in replication the chart may have increments of unequal size that represent equal sized increments on the ground. At the control unit, the operator has an oscilloscope display upon which the reflected wave form can be continuously monitored. Controls are also available which are used to adjust and optimize the wave form to produce the best output on the graphic chart recorder. In addition, wave forms are recorded on magnetic tape and can later be reproduced in the lab. This provides for data reduction and computer generated enhancement of the radar profiles in the laboratory.

This remote sensing technique was selected for the floodplain of Navigation Pool 11 in large part because of successful application in similar environments in Navigation Pool 10 (Overstreet 1984a). The applications were primarily for purposes of surficial geology. Coring is a difficult and tedious task when relying on hand tools. In addition, the sample of sub-surface data is quite small and discontinuous, based on selected intervals. With the GPR, we were able to continuously monitor sub-surface conditions and correlate these data with auger results. Thus, for comprehensive sub-surface data collection, radar application results in significant time and cost savings.

Radar investigations were conducted with the express purpose of providing detail not available from coring and auger operations to reconstruct the geomorphic and fluvial histories of the floodplain. Data collected were applied to development of detailed cross-sections of the valley presented as part of the predictive model.

The first location investigated is Jack Oak Island (see Figure 5). Four runs were completed at this location, the first of which was placed along the northern shoreline of Jack Oak Island, across from the western end of a landing field on the Mississippi shoreline. Radar results indicate a deep anomaly along the northern part of the run approximately from station 55 to station 130. The anomaly is dome-shaped and fairly strong. It is estimated to be at a depth of approximately 7-9 feet below the surface. There is also a deeper anomaly at approximately 11 feet. This anomaly is fairly continuous across the entire run although the return signal is weak in places because this is the maximum depth penetrated by the radar at this location. A large surface anomaly was also detected between the start of the southern end of the line and station 10.

Run No. 2 at Jack Oak Island was located along the north shore of Jack Oak Island and to the west of Run No. 1. A number of laterally extensive anomalies appear on Run No.

2 charts. Shallow interfaces are less distinct than the deeper ones. Depth penetration at this locality was good.

The first weak interface seen at approximately 6 feet has been correlated to the water table. Other possible causes for the interface would be the change from the surface Holocene silts to the underlying fine sands or the reflection of the signal from the underlying fine sands or the reflection of the signal from the Beta B soil horizon. The silt/sand interface occurs at approximately 80 cm which is too shallow to correlate with the reflection seen on the radar strip chart. Reflections from the Beta B horizon may account for some of the shallower reflections. However, radar velocities are most consistent with published velocities if the first interface is correlated to the water table.

A second deeper interface is seen at approximately 70 nanoseconds, or, 7-8'. The reflection from this is stronger and may represent a lithologic change. One of the borings taken at this location encountered clay enrichment at 8' (2.5m). There is an additional strong interface at approximately 90 nanoseconds or 10'. The signals are strong and may indicate that the reflection is derived from an interface of fine-coarse sediments. Two shallow (less than 2') anomalies were seen near the surface at 58 and 79' along the run.

Run No. 3 on Jack Oak Island yielded information relating to two laterally continuous interfaces. This run or traverse was taken south of Run No. 2 along the second ridge of lateral accretion south of the northern shoreline of the island. The interface at approximately 25 nanoseconds correlated with the textural change between finer grained flood deposits from 0.0 - 85.0cm. In addition, the interface remains at a relatively constant elevation.

The depth of a deeper interface seen at approximately 50 nanoseconds appears to correlate with the water table. This interface is somewhat obscure between station's 70-100 and is irregular across the strip chart. The loss of the strong reflection in some areas may be the result of the presence of small amounts of clay found below a depth of approximately 200 cm. The water table and the clay Beta-B banding are also found near this elevation. Therefore, these interfaces may be too close together to be resolved with the use of the 500 megahertz antenna.

A few shallow, small anomalies are also seen along this run. These are found at stations 30, 57, 91, 105, and 114. One deeper anomaly at a depth of approximately 3' was also detected at station 104.

Run No. 4 provided good depth penetration and the subsurface profile was fairly consistent over the length of the run. Two distinct interfaces are seen at approximately 5 and 13 nanoseconds or approximately 1' and 2.5'. The deeper interface is correlated with the water table which was noted at 80 cm. The shallower interface corresponds with a textural change from historic period silts (PSA) to mottled,

clayey silts which occur at 35 cm. Between stations 40 and 50 the signal becomes very weak, even at shallow depths, while between stations 30 and 60 there is little return signal below a depth of about 3'. The cause of this large anomaly is not known. Figures 6-9 present stratigraphic and anamoly profiles constructed from ground penetrating radar data at Jack Oak Island. (These oversized Plates are Appended)

Two runs were completed at Jack Oak Slough (see Figure 5). A number of interfaces are seen along Run No. 1 at this location. There is a shallow interface at approximately 25 nanoseconds or 3'. This continues along the entire traverse though it is not so apparent between stations 95 and 150. There also appears to be a shallower interface at approximately 10 nanoseconds or 1.5'. This is continuous across the entire site. A deeper interface seen at approximately 55 to 65 nanoseconds (7-8') is apparent from station 52 to station 180 which is the end of the run.

Between stations 50 and 90, there are additional reflections occurring above the lower continuous interface. These reflections occur at approximately 5'. The cause of these reflectances is not known. The deeper interface seems to be associated with an increase in clay content as found in boring No. 1 at approxiamtely 2.60m. A boring to the south along this run is correlated to the GPR data as follows. The radar interface at approximately 3.0' corresponds to the interface between flood deposits and the underlying paleosol which occurs at approximately 85cm. An intermediate interface seen beween stations 50 and 90 is correlated to the increase in clay which occurs at approximately 210cm. A stronger reflectance is seen below this layer at a depth beyond that investigated by the soil borings. Therefore, the cause of the deepest anomaly is not known.

Numerous small anomalies were detected at stations 18, 29, 32, 47, 90, and 96. These are within 2' of the ground surface. One deeper anomaly at approximately 3 to 4' was also detected at station 82.

Run No. 2 at Jack Oak Slough has less depth penetration than Run No. 1. A distinct, intermediate interface is seen at approximately 25 nanoseconds or 3'. Since no boring data were available for this traverse, interpretations were not made in the field. There are numerous shallow anomalies which are less than 3' deep and include the following locations: station 18, 23, 38, 49, and 60. There is also one deep anomaly at station 67 at approximately 4'. The shallow anomalies seen along this traverse are different from other shallow anomalies because they occur as phase changes in the radar wave form. This suggests that these anomalies may be caused by soil variations instead of specific subsurface objects. Figures 10-11 depict stratigraphy and anomalies in profiles constructed from GPR at Jack Oak slough. (These oversized Plates are Appended)

The third location investigated was the Turkey River fan and bottom (see Figure 5). Radar investigations pro-

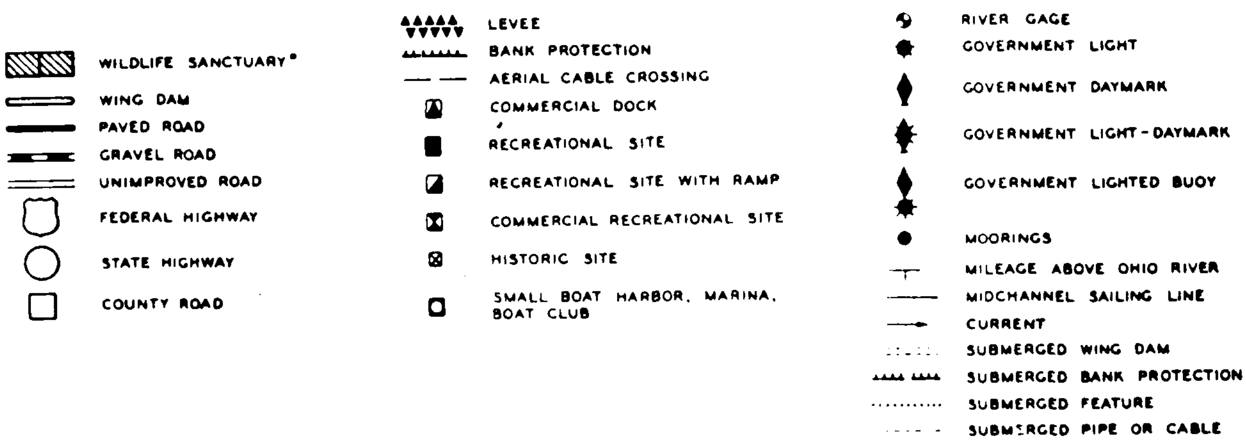
duced equivocal results because of poor depth penetration. No interfaces were detectable on the strip charts. Boring information collected at the GPR stations indicates a thick sequence of very fine sands, clayey silts, and silty clays. It is suspected that the high clay content, fine grained nature of the deposits, and their relative homogeneity resulted in the small depth of penetration and lack of reflectances.

Combined interpretations of raw GPR data, boring information coincident with radar runs, and those conducted subsequent to GPR investigations were correlated to aid in the identification of various sub-surface phenomena including soil development, depth of historic-prehistoric contacts, and differential sediment compositions, which in turn represent surfaces of different ages. Valley cross-sections and other interpretations are provided in the predictive model presented in a subsequent section of this report.

6. INVESTIGATIONS AT SPECIAL USE AREAS:

Fourteen localities associated with special use areas were surveyed because of potential future impacts. Disturbance is associated with the development of recreational facilities. As a result, surface and sub-surface investigations were conducted at each of these areas. Figure 5 denotes the locations of these areas within Navigation Pool 11 and each investigation is summarized below.

Note: The following maps are derived from RID-COE Master Plan for Resource Management. Their intent is to provide specific locations of special use areas. The following key is provided to identify various cultural and natural features.



6.1 BERTOM LAKE LAUNCHING AREA FW-218

Location and Landuse: (Figure 12)

The Bertom Lake launching area, tract No. FW-218 is located on a low terrace between Bertom Lake to the west and McCartney Lake to the east at river mile 601.4. The tract occupies four acres at an elevation of just under 605' AMSL. The project area is bordered on the north by the Chicago, Burlington and Quincy Railroad and on the south by the backwaters of the Mississippi River. North of the railroad tracks the bluffs rise sharply. A small tributary stream is located approximately 380m east of the project area. Project area vegetation consists of bur oak, silver maple and river birch with an understory of poison ivy and silver maple. FW-218 is located off State Route 133 three miles east of Cassville, Wisconsin.

Archival Data:

No historic or prehistoric sites have been recorded on the lowland floodplain of the Mississippi River or on its associated terraces on or adjacent to the project area.

Field Investigation:

On May 17, June 18, and June 19 the project area was inaccessible due to high river stages. On October 25, 1984 the project area was surveyed combining pedestrian survey of the cutbank and coring using a one inch silt probe. The pedestrian survey produced negative results. A one inch silt probe was then employed to determine the depth of the presettlement surface. The resulting profile (Fig. 13) shows weakly defined presettlement sediments within .50m of the surface. Another older surface is suggested at 2.20m. One silt probe core was taken and the profile was described.

Geomorphic Setting and Interpretation:

This site is located on a low Mississippi terrace along a minor floodplain channel and composed of mixed lateral and vertical accretion deposits with a thin mantle of post settlement alluvium capping the surface. This site is situated close to the east valley wall and within 100m of the railroad grade.

Only about 20cm. of post settlement material is found on the surface. Vertical accumulation of post settlement silt is slow. In turn, mixing between the historical and the presettlement surfaces has taken place. An increase in clay content is seen in the lower horizon between 20cm and 50cm which is interpreted as an illuvial unit. Lower in the profile a weak but apparent stable surface is developed at 2.1m.

Below this lower surface, reworking of minor channel deposits has created abrupt textural contacts with coarse textured material occuring in thin (less than 5cm.) units. Some antiquity may exist in the lower portion of the profile judging by the presence of outwash granules. However, these may be basin sediments which have been reworked, forming

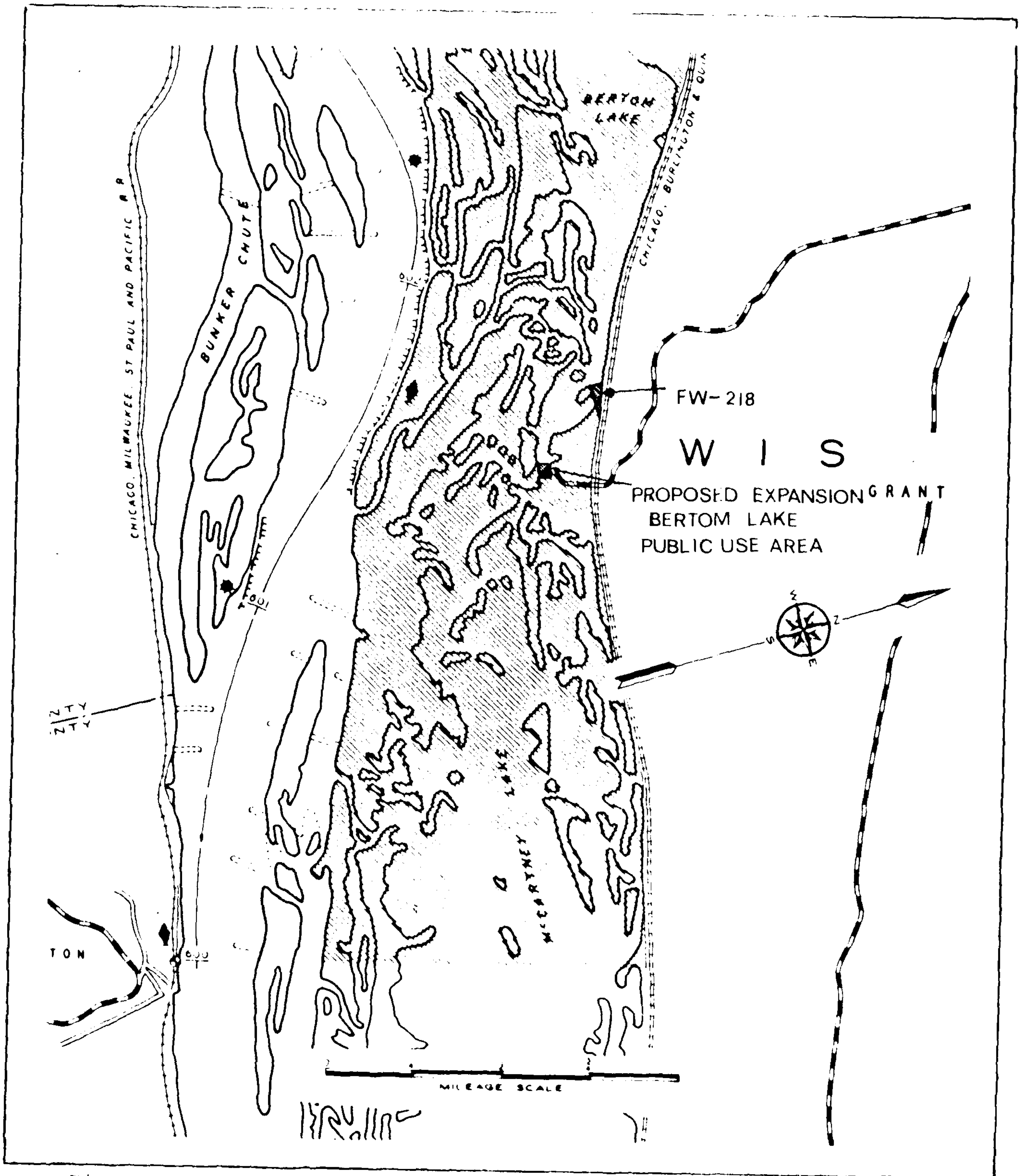


Figure 12: Special Use Area FW-218, Bertrom Lake.

FW-218 BERTOM LAKE

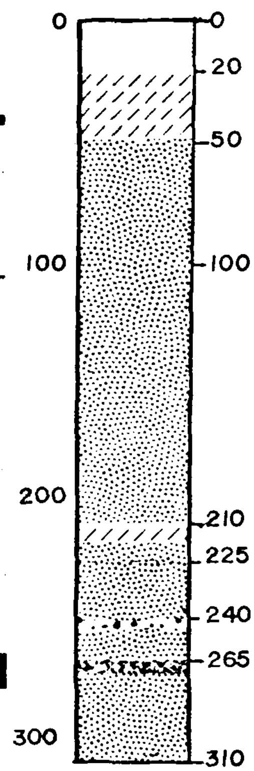


Figure 13: Profile, FW-218, Bertrom Lake.

point bar deposits. The relative degree of soil development seen through the profile would suggest that the deposits found at the base probably represent late Holocene material. Intact prehistoric sites may exist at this locale but would likely be restricted to late prehistoric (Woodland) manifestations.

Results/Recommendations:

As indicated in Figure 12, most of FW-218 is permanently inundated. In the small relatively dry portion in the far eastern segment of the tract, moderate amounts of post-settlement alluvium are recorded. More significantly, there is evidence of an intact surface at 2.2 m below the surface. Proposed developments that do not entail removal or disturbance of surficial deposits below .5m of the present surface will have no impact on potentially significant cultural resources. However, development of facilities that entail excavation should be subjected to monitoring during construction activities. Ideally, the post-settlement overburden should be stripped, and, the matrix of the pre-settlement soils carefully inspected for the presence of cultural materials.

6.2 LYNN HOLLOW LAUNCHING AREA FW-200

Location and Landuse: (Figure 14)

The Lynn Hollow launching area is located approximately three miles west of the confluence of the Grant River and the Mississippi River at river mile 596.1 in Grant County, Wisconsin. Tract No. FW-200 occupies four acres of lowland floodplain riverward of the Burlington Northern Railroad at the confluence of an unnamed intermittent stream and the backwaters of the Mississippi River. Elevation is approximately 605' AMSL. The project area is bordered on the north by bluffs and a small valley occupied by the intermittent stream mentioned above. Another intermittent stream lies to the northeast of the project area. Its course has been altered by the railroad after its descent from the uplands and it now flows west to meet the intermittent stream north of railroad tracks. The vegetation of tract FW-200 is predominately silver maple 3" to 12" breast height diameter (d.b.h.) and some willows with an understory of nettles. The channelized portion of the stream riverward of the tracks is choked with silt. Run off from the uplands deposits silts over the stream's bank and onto the adjacent lowland.

Archival Data:

No historic or prehistoric sites have been recorded on the lowland floodplain of the Mississippi River or on associated terraces on or adjacent to FW-200.

Field Investigations:

The Lynn Hollow launching area was visited on 5/17/84 and again on 6/18/84. On both occasions high river stages

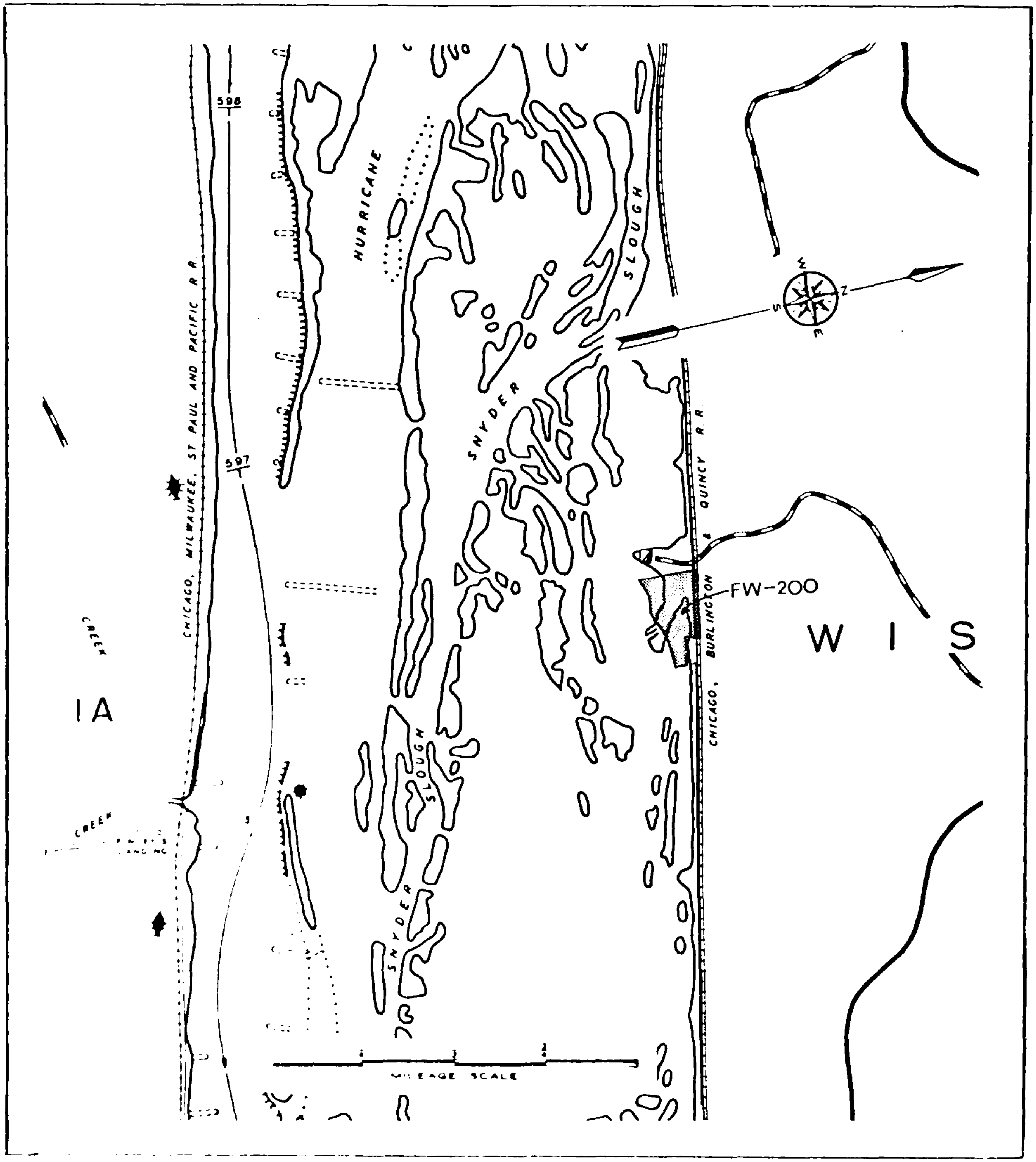


Figure 14: Special Use Area FW-200, Lynn Hollow Launch Area.

had inundated the project area. On 5/25/84 the project area was surveyed using a pedestrian survey combined with coring. The northwest-southeast trending channelized stream cut bank was walked with negative results. A pedestrian survey of the shoreline was not initiated due to shore alluviation and an abundance of emergent aquatic plants. A one inch silt probe was then employed to obtain a soil profile in the wooded area southwest of the channelized intermittent stream. The resulting profile shows a presettlement surface at 2.80m (Figure 15). One silt probe core and 1 sample were taken. The profile was described.

Geomorphic Setting and Interpretation:

This site is on a tributary floodplain which flows on a low Mississippi terrace. The site is primarily composed of mixed lateral and vertical accretion deposits. Similar to the McCartney locality, this site is on the downstream side of the floodplain and has experienced considerable vertical accretion from post settlement deposits.

The historical component extends to at least 2.8m and may possibly extend to the base of the 5.1m profile. Organic enrichment occurs at 2.8m but may represent historical flood debris rather than a presettlement surface horizon. Below 2.8m alluvial episodes dominate the profile in the form of alternating textural bands with abrupt contacts. No apparent soil horizons were seen in the profile.

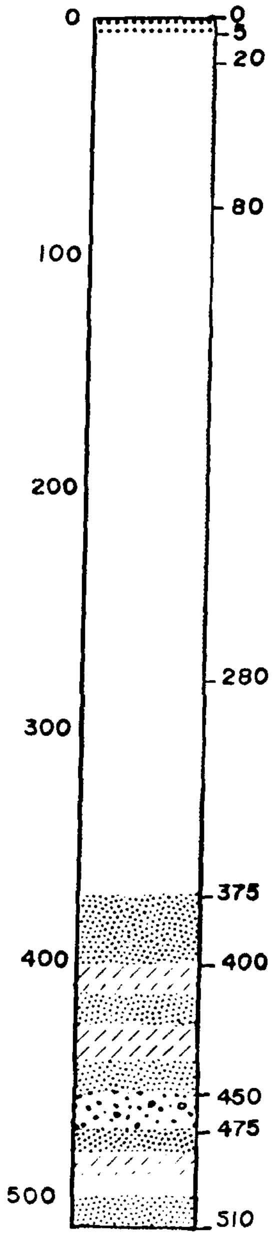
The highly calcareous unit seen at the base of the profile suggests that historic tributary deposits occur at a depth of 5.1m. This site may represent flood episodes that originate from both the main valley and from the tributary. Evidence is seen from the medium sands that may represent main valley flooding and from the angular carbonate fragments that likely originate from the tributary valley.

The profile indicates that the deposits represent historical alluviation. However, poor weather conditions hampered the on site study and may have affected the profile field description. The organic enriched horizon seen at 2.8m appeared to be the presettlement surface when viewed in the field, but further analysis clouded this initial interpretation. An additional coring would help to resolve the nature of the units observed below 2.8m and verify their suspected young age.

Results/Recommendations:

As more than 6' of PSA (possibly 15') has been deposited at Lynn Hollow (FW-200) it is likely that proposed development would not endanger potentially significant cultural resources. We would recommend that only those activities that would result in disturbance of the pre-settlement surface (i.e., more than 6' below the surface) be subjected to further investigation. The most efficient means would be through monitoring of construction.

FW-200 LYNN HOLLOW



Medium sand, 10YR 4/4, this year's historical deposit
Silt, 10YR 2/3, organic enrichment, calcareous
Silt, 10YR 3/3-4/4, calcareous

Mottled & gleyed

Silt, gleyed, calcareous

Silt with minor clay, gleyed, organic enrichment, non calcareous

Silty fine sand, gleyed

Clayey silt, gleyed with alternating bands of silty fine sand. Each band approximately 5 cm. thick.

Approximately 5 cm. band of medium sand with few granules observed

Alternating bands of silty fine sand & clayey silt & silt, 10YR 3/1 calcareous with angular carbonate fragments observed

Figure 15: Profile, FW-200, Lynn Hollow Launch Area.

6.3 SCHLEICHER'S COMMERCIAL RECREATION AREA FW-274

Location and Landuse: (Figure 16)

Schleicher's Commercial Recreation Area is located four miles northwest of Cassville, Wisconsin off Closing Dam Road at river mile 613.7. The four acre tract ranges in elevation from 605' AMSL on the lowland floodplain to 620' AMSL where the land rises to a terrace and an alluvial fan. To the east the bluffs rise sharply with one intermittent stream flowing down a small valley or hollow, the channelized portion of which forms the southeast boundary of FW-274. Vegetation consists of silver maple, cottonwood and elm. The developed portion, known as Schleicher's Landing, is an open area of mowed grasses. Cottages are located on the terrace and camping areas and a boat landing are situated on the lowland floodplain below. A main channel of the Mississippi River borders the tract on the west and the Chicago, Burlington and Quincy Railroad borders on the east.

Archival Data:

No historic or prehistoric sites are recorded on the lowland floodplain or on its associated terraces within or adjacent to FW-274. However, an interview conducted with Mr. Mark Schleicher revealed the presence of a mound group located on the blufftop due northeast of the project area. Also, a side notched point from the late Archaic period was found by Mark Schleicher approximately 100m up the small valley across Closing Dam Road, due east of FW-274.

Field Investigations:

The area was first visited on 5/17/84, but the high river stage prevented any fieldwork. The area was revisited on 6/14/84 and surveyed. Field testing involved a pedestrian survey together with coring using a one inch silt probe. The low erosional cutbank was surveyed as well as the channelized portion of the intermittent stream. The pedestrian survey met with negative results. Coring was then employed to determine the depth of the presettlement surface. A total of 5 core holes were placed in the wooded area and in the lowland floodplain below the Schleicher residence. In the wooded area test holes 1 and 2 showed historic deposits to a depth of 3.85m (Figure 17). The resulting profile from a compilation of test holes 3, 4, and 5 shows 4.00m of historic sediments and a probable presettlement surface at 4.25m (Figure 18). All profiles were described, photographic records were made, and six lab samples were collected for analysis.

Geomorphic Setting and Interpretation:

The site is located on a tributary alluvial fan deposit which is adjacent to Cassville slough. The fan is buried by several feet of post settlement alluvium. Similar to Wolf Creek, the Schleicher's Landing profile shows episodes of alluviation characterized by deposits of silt, silty sand and sandy silt. With the exception of the weakly developed,

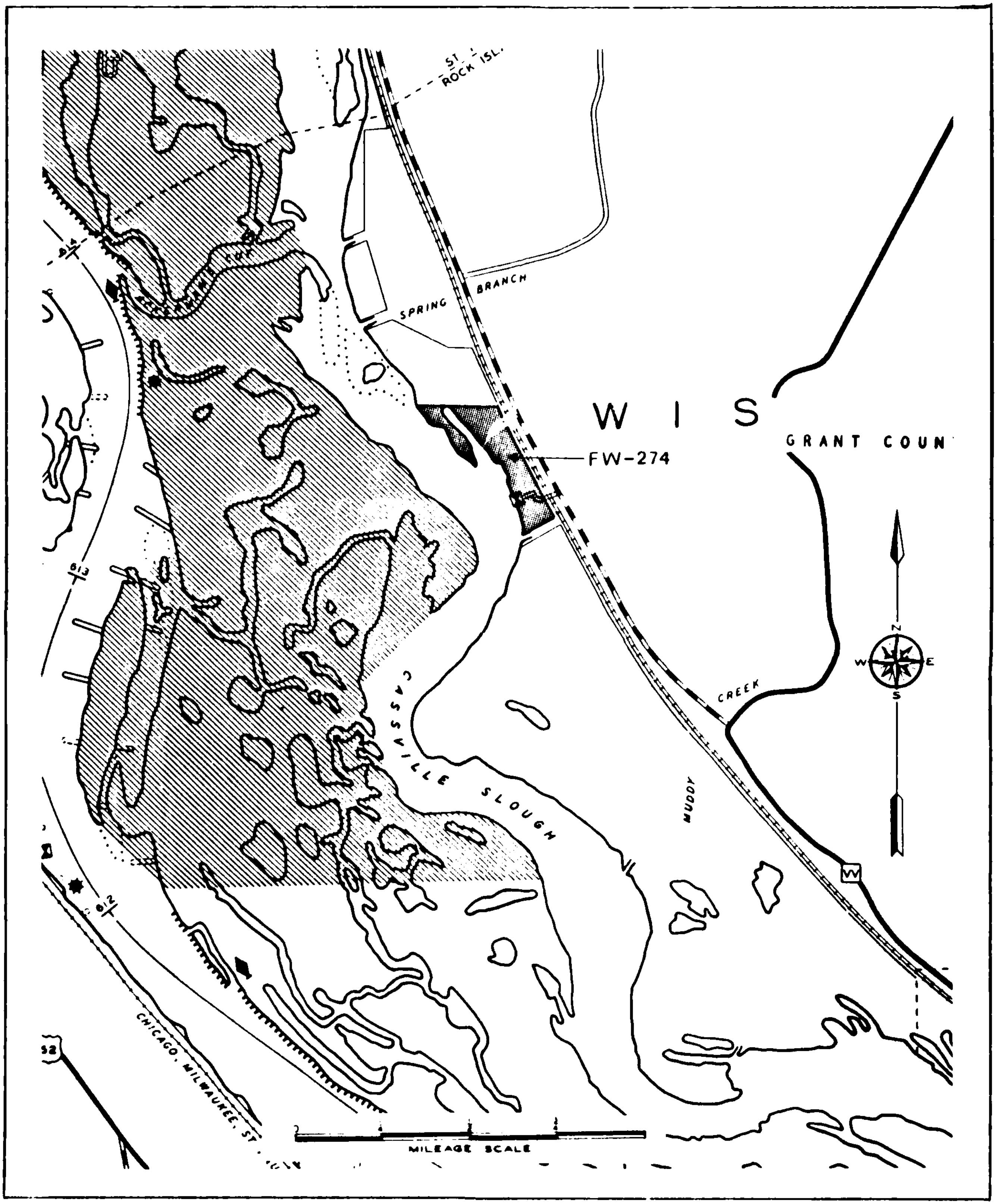
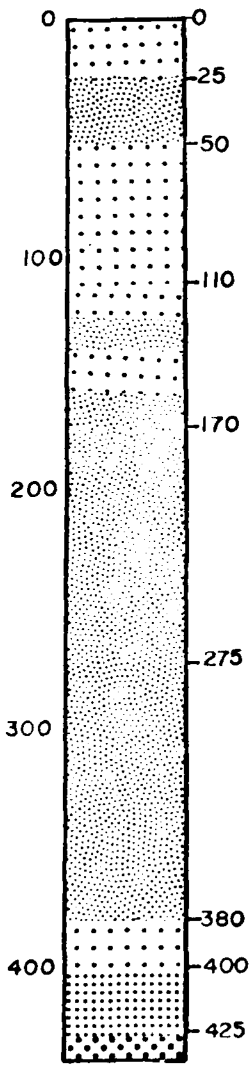


Figure 16: Special Use Area FW-274, Schleicher's Landing.

FW-274 SCHLEICHERS LANDING



Fine sandy silt, 10YR 3/2-3/3

Silty fine sand, 10YR 4/4, highly calcareous

Fine sandy silt, 10YR 4/4, highly calcareous

Alternating bands of sandy silt & silty sand, mottled & gleyed, highly calcareous

Silty fine sand, 10Y 4/1, gleyed, highly calcareous

Clam shell at 265 cm.

Silty fine sand, 5Y 5/1, gleyed, highly calcareous

Clam shell at 320, 380 cm.

Sandy silt, gleyed, calcareous & wood fragments

Medium sand with minor silt, calcareous, angular carbonates observed

Coarse sand, 10YR 1.7/1, chert granule & clam shell observed

Figure 17: Profile, FW-274, Schleicher's Landing

FW-274 SCHLEICHER'S LANDING

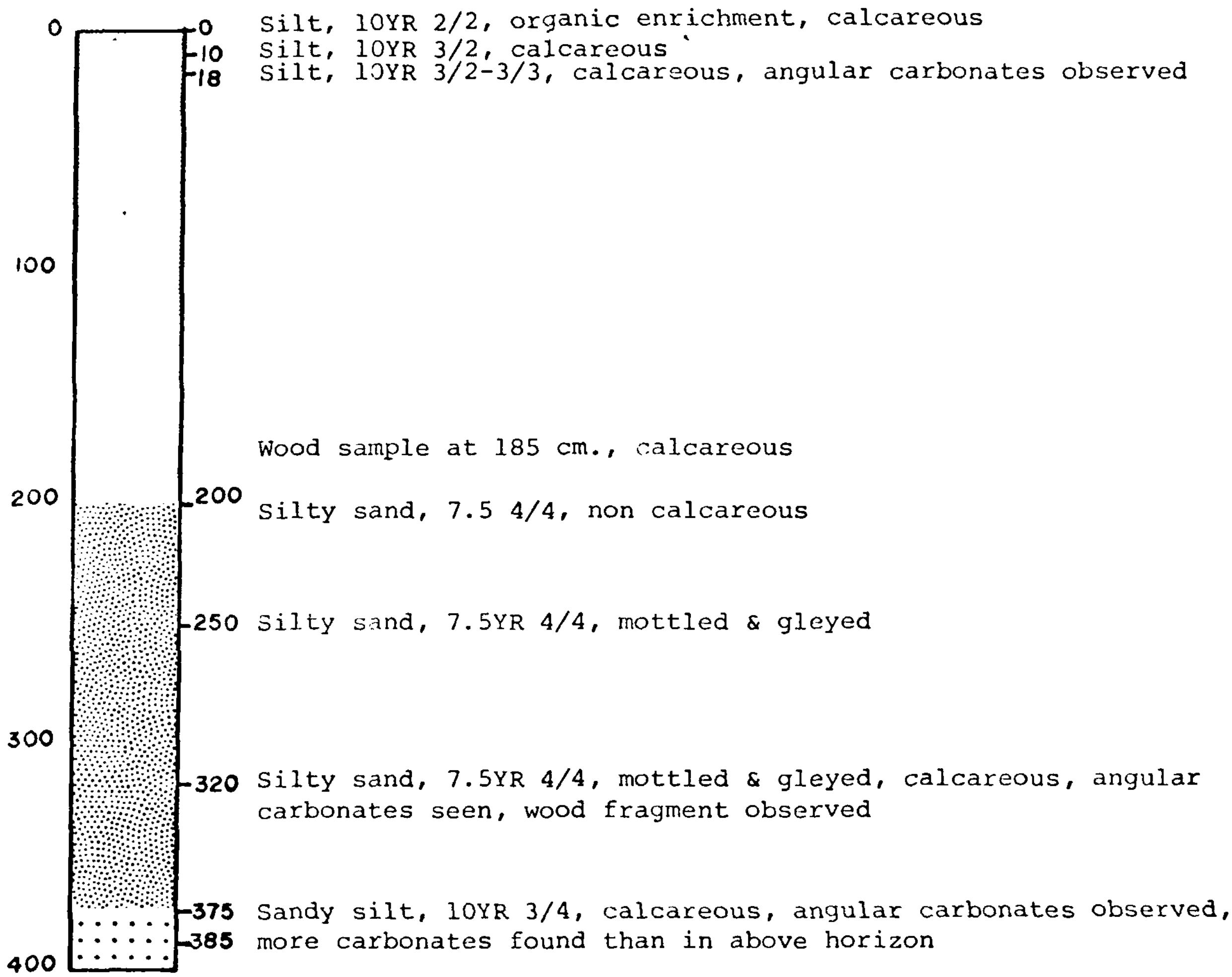


Figure 18: Profile, FW-274, Schleicher's Landing.

organic enriched surface, the remainder of the profile shows no pedogenic horizons.

Additional information about the site was obtained from lab investigations and from two cores that penetrated deeper than 4.0m. From a sample taken between 300cm and 330cm the presence of angular metallic, dolomitic, and calcitic sand sized particles was observed. This unit is interpreted to contain mine tailings of local origin and the highly calcareous material extends to about 4.0m. In two of the silt probe cores, the profile was extended down to 425cm. At 400cm a dark (10 YR 1.7/1) organic rich horizon developed in medium sand was observed and interpreted to be the presettlement surface horizon.

Schleicher's Landing is buried by approximately 4.0m of historical alluvium. The alluvium is derived locally from the adjacent upland, and from Mississippi River basin deposits. Like Wolf Creek, a very low probability of discovering cultural contexts near the surface exists.

Results/Recommendations:

Depth of historic period alluvium prohibits the identification of archaeological sites at this locality. Again, it is unlikely that proposed developments will impact the pre-settlement surface situated between 3.85 and 4.25m below the present surface. If extensive earth-moving activities are contemplated, monitoring activities should be integrated into the construction process.

6.4 MUD LAKE RECREATION AREA FIA-41 AND FIA-45

Location and Landuse: (Figure 19)

The Mud lake Recreation Area (tract No's FIA-41 and FIA-45) is located on the Iowa side of the Mississippi River two miles north of confluence of the Little Maquoketa River and the Mississippi River at river mile 589.4. These tracts lie north and south of Mud Lake, a small bay created by rising water after the construction of the lock & dam system in the mid 1930's. Together the two tracts occupy 57 acres with an elevation of 610' AMSL on the terrace sloping to less than 605' AMSL riverward on the lowland floodplain. FIA-45 includes a marina, campground, and boat landing with gravel roads. This recreational area has maintained lawn-grass and is thinly wooded with cottonwood and willow. FIA-41 to the south is a wooded area having silver maple, cottonwood and elm with an understory of woodnettle and some jewelweed. A channelized stretch of Leisure Creek bisects FIA-41. A small island lies offshore. These two tracts are bounded on the east by the main channel of the Mississippi River and on the west by the Chicago, Milwaukee, St. Paul, & Pacific Railroad. West of the railroad tracks is a high terrace extending westward to high bluffs. Two valleys descend the uplands, the northern valley occupied by an intermittent stream and the southern valley by Leisure

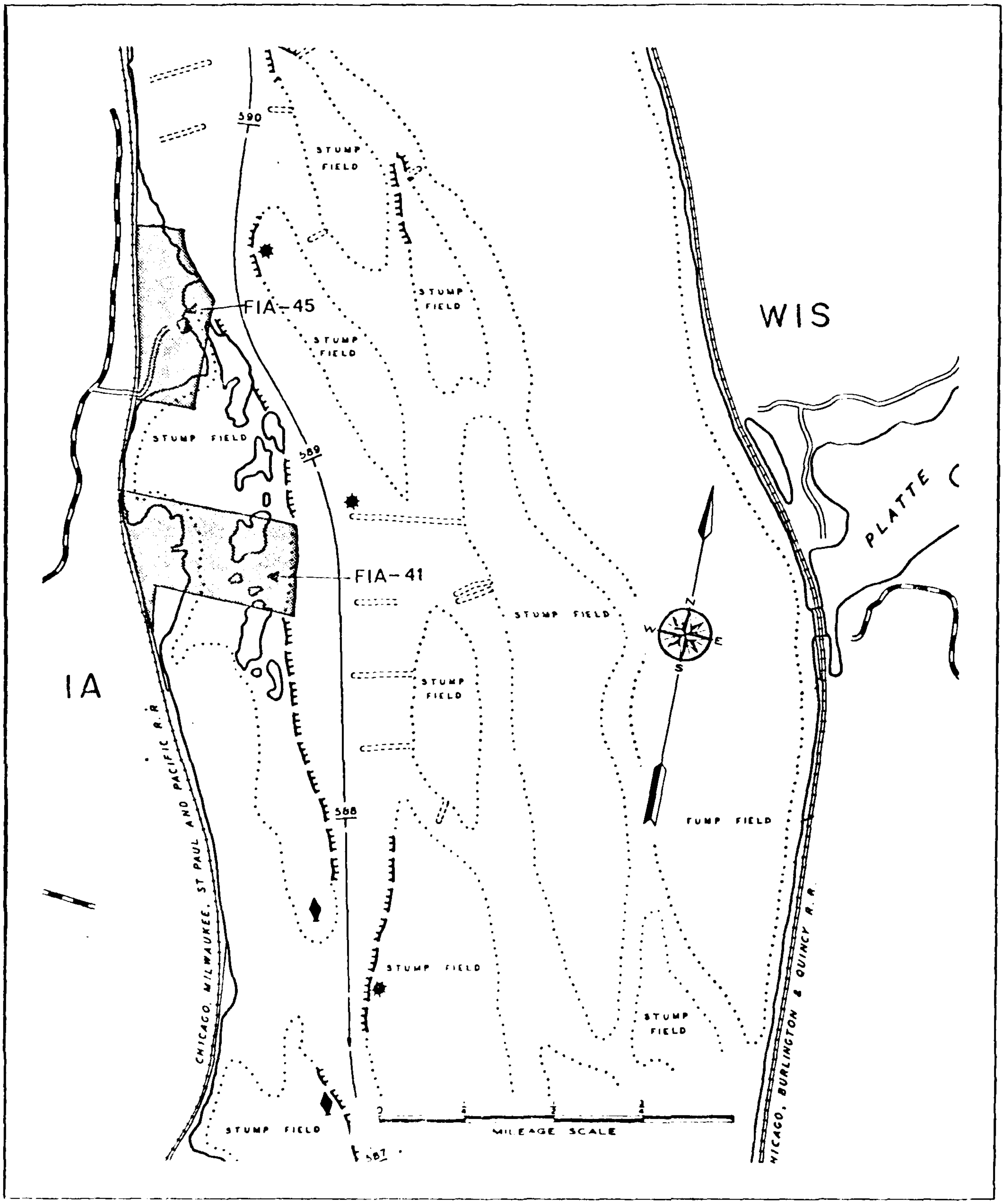


Figure 19: Special Use Areas FIA-41 & 45, Mud Lake.

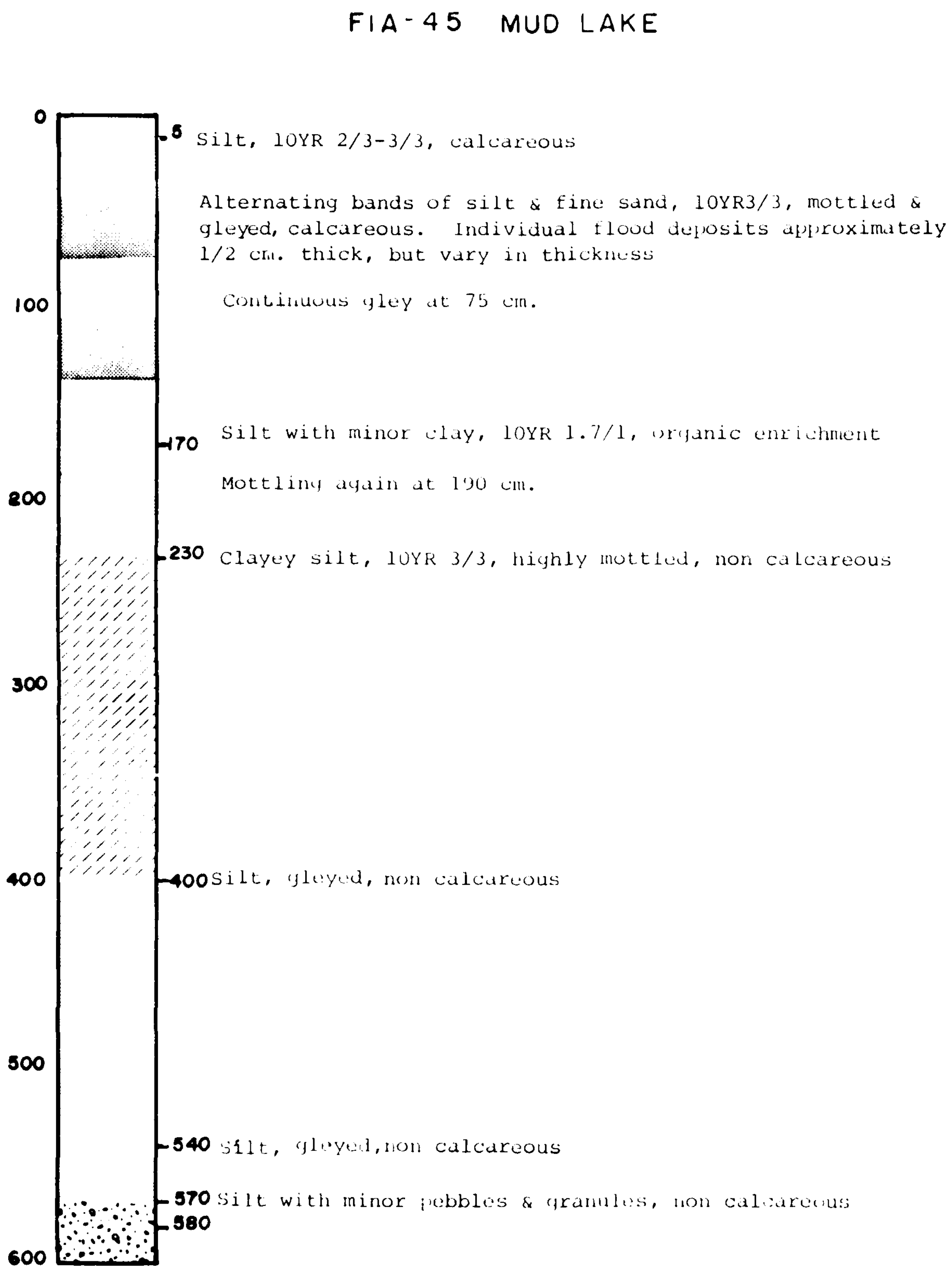


Figure 20: Profile, FIA-45, Mud Lake

FIA-41 LEISURE CREEK

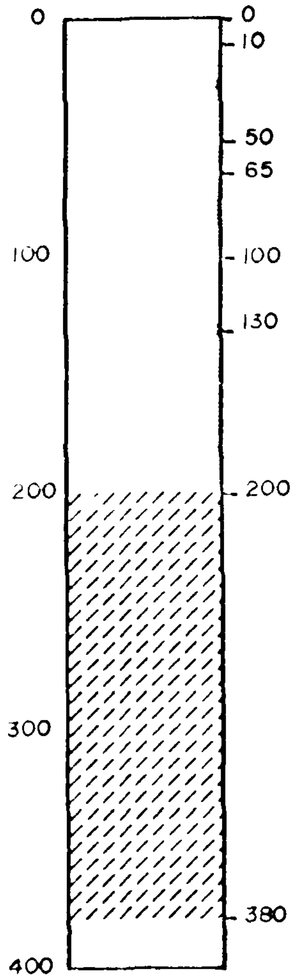


Figure 21: Profile, FIA 41, Leisure Creek.

Creek. U.S. Route 52 is approximately three miles south of the project area.

Archival Data:

The Iowa site record files show one prehistoric site recorded on the terrace bordering Mud Lake (13 Db 29) along the King's Row development. Many prehistoric sites have been recorded two miles across the Mississippi gorge at the mouth of the Platte River in Wisconsin. No historic sites have been recorded on or adjacent to the project area.

Field Investigations:

Coring and pedestrian surveys were carried out at tracts No's FIA-41 and FIA-45 on May 21st and on June 6th, 21st, 22nd and 26th of 1984. At FIA-41 a pedestrian survey along the south cut bank of the channelized stretch of Leisure Creek produced negative results. Coring was conducted at the south end of the mouth of Leisure Creek using a one inch silt probe to determine the depth of the presettlement surface. The resulting profiles consistently showed a presettlement surface at a depth of 1.70m (Figure 20). Due to the lack of erosional features and the abundance of emergent aquatic vegetation along the shoreline at FIA-45, pedestrian survey was abandoned in favor of a series of one inch silt probe tests. Test holes produced consistant data concerning the depth of the presettlement surface. The probable presettlement surface was noted at a depth of .65m (Figure 21). At FIA 45, one silt probe core was described and four samples were taken.

Geomorphic Setting and Interpretation: (FIA 45)

FIA 45 is located on an alluvial fan which overlies a low Mississippi river terrace. The sediments are primarily vertical accretion deposits but in one profile a basal unit of sand and gravel was observed. The surface has historical deposits which show individual flood events in the form of silt and sand. Each flood event yields a deposit which varies in thickness from 3 or 4mm thick.

The top 5cm shows a developing surface A horizon with darker color and organic material. This surface horizon is developing in approximately 1.7m of PSA. Beneath this historical surface unit is a well developed pre-settlement surface horizon and a subjacent B horizon. The argillic horizon grades into a siltier unit by 4.0m.

In the deepest hole of 5.8m, sand and granules were observed but the age of this unit is unknown. It cannot be determined whether the coarser material represents reworking of the terrace material from lateral accretion processes, or if this deposit represents older deposits in response to the events of the late Woodfordian to early Holocene.

One of the cores showed a weak surface expression at 5.0m. A slightly darker soil color was seen which indicated that a previous stable surface existed, although like the

deeper coarser unit the age of this surface has not been determined.

Similar to Mud Lake, FIA 41 is located on an alluvial fan which overlies a low Mississippi terrace. The profile description suggests that vertical accretion has been the dominant alluvial process. The surface is capped with PSA but a rather well defined pre-settlement surface horizon is observed.

The post settlement material which is highly calcareous extends to at least 65cm. Below this surficial unit is an organic rich horizon interpreted to be the pre-settlement surface. This silty horizon becomes more clayey indicating the presence of a subsurface horizon but then grades back to a slightly coarser silty texture near the base of the profile.

A weakly calcareous unit is observed in the clay enriched horizon at 2.0m. This would suggest that the post settlement material may extend to this depth, however, the leaching of carbonates from above horizons and subsequent illuviation may be the reason for this apparent anomaly. The well developed A horizon seen beginning at 65cm. is interpeted to the pre-settlement surface and the sediments observed below are considered to represent late Holocene vertical accretion deposits.

Results/Recommendations

Post-A.D. 1850 deposition varies from 1.7m at FIA41 to .65m at FIA45. Relative depths of site burial should be evaluated with regard to future facilities construction. If earth disturbances warrant, construction should be monitored by a qualified archaeological technician. It would not be efficient to apply conventional methods of archaeological survey at these locations owing to the extent of recent historic overburden.

6.5 JAMESTOWN RECREATION AREA A-3 AND A-6

Location and Landuse: (Figure 22)

The Jamestown Recreation Area is located northeast of Dubuque, Iowa at Lock and Dam No. 11. Tract A-3 and A-6 occupy 10 acres of lowland floodplain and levee at river mile 583.0 off an abandoned stretch of U.S. Route 61. Stumpf Island lies to the south. These tracts area bordered on the east by the Burlington Northern Railroad and on the west by the main channel of the Mississippi River. Elevation of the unaltered lowland floodplain is approximately 600' AMSL. Tract number A-3, at the east end of O'Leary Lake, is an open park-like area with a gravel parking lot, a thinly wooded area with cottonwood 15" d.b.h., and silver maple 4" - 15" d.b.h. O'Leary Lake is a popular fishing spot. Tract number A-6 is a narrow strip running along the north levee bank and extends approximately 60m off shore.

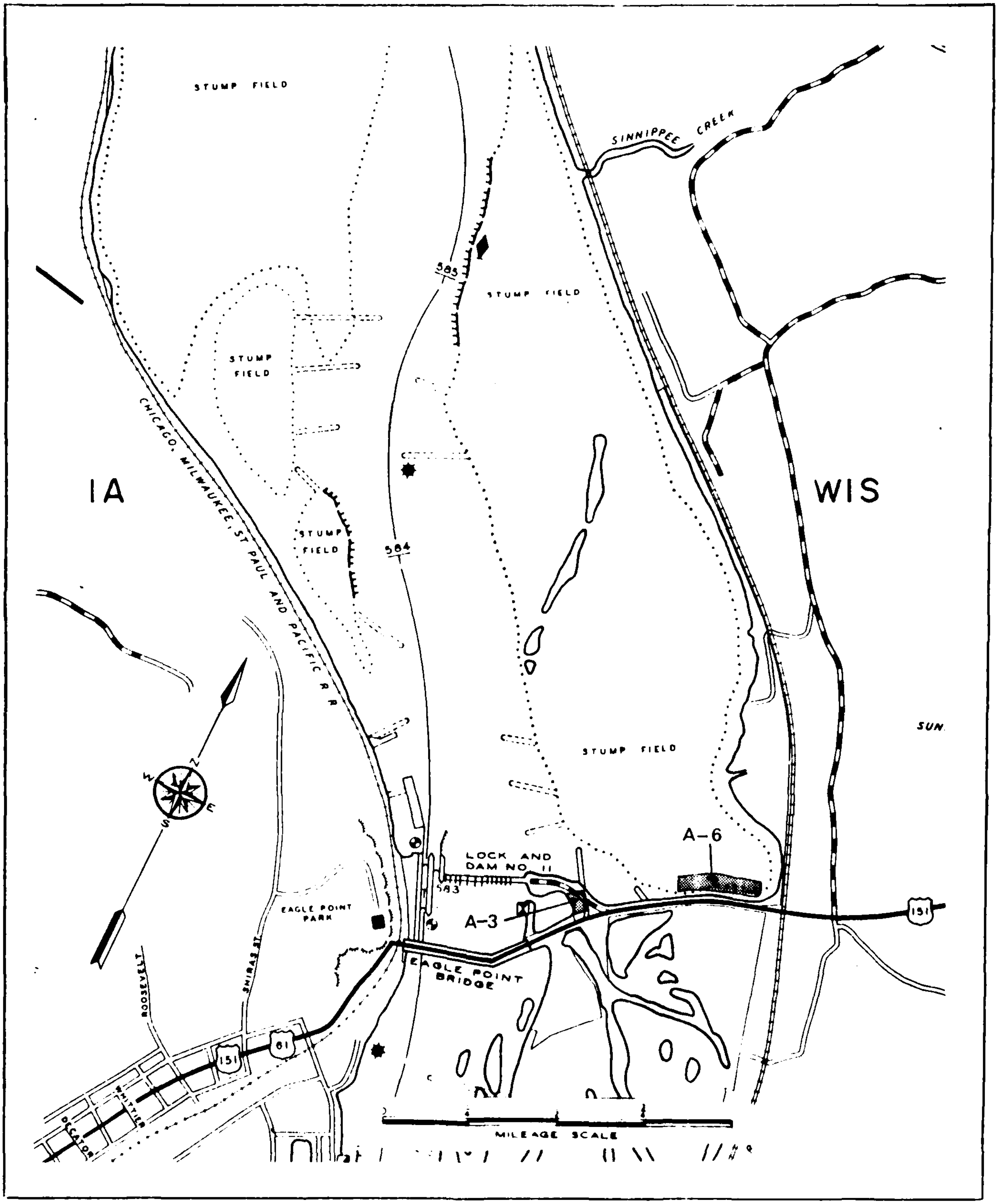


Figure 22: Special Use Areas A-3, A-6, Jamestown.

Archival Data:

Historic sites associated with the project area include Lock & Dam No. 11 (map code #1) and the old townsite of Sinnipee (map code #68). In the 1830's, Sinnipee was an important lead terminal shipping point. Lead ore was shipped to St. Louis from this town.

Two prehistoric sites 47 Gt 184 and 47 Gt 185 are located on either side of an intermittent drainage 700m north of tract No. A-6. No other terrace or floodplain sites are recorded in the immediate vicinity.

Field Investigations:

On 5/18/84 tract No. A-3, a pedestrian survey of the shoreline of O'Leary Lake was carried out with negative results. Tract No. A-6 being a man made levee was photographed but no coring or pedestrian survey was initiated.

A one inch silt probe was used for testing at unaltered locations at tract No. A-3 on 6/20/84. The resulting profile shows historic alluvium throughout to a depth of 3.70m (Figure 23). No presettlement surface was reached. A total of 2 silt probe cores were taken, 4 samples were collected and the profiles were described.

Geomorphic Setting and Interpretation:

Prior to lock and dam impoundment, this site appeared to be in association with an island unit. The site is now located behind an artificial levee adjacent to Lock and Dam No. 11 and O'Leary Lake. Protected from the main channel flow regime, the lake frequently adjusts its level in response to the lock and dam discharge. During high river stages the lake acts as a backwater area inundating the site and depositing sediment. The entire profile reflects high rates of vertical accretion and is composed only of post settlement alluvium.

Individual alluvial episodes in the form of alternating bands of fine sand and silt occur throughout the profile. Further evidence of historical material is seen from angular carbonate fragments and coal cinders. No evidence of the pre-settlement surface was uncovered.

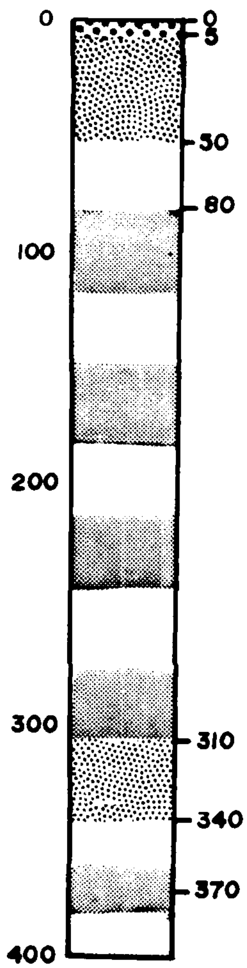
Results/Recommendations:

Limitations of hand tools prevented the definition of the depth of the pre-settlement surface. At least 3.7m of recent (post-1850) deposits cover the older surfaces. It appears unlikely that any proposed facilities development or improvements will impact potentially significant cultural resources. If earth moving activities are scheduled to occur beyond depths of 3.7m, monitoring of such construction should be implemented.

6.6 MUDDY CREEK PUBLIC USE AREA, FW-269 (Figure 24)

The Muddy Creek Public Use Area (tract No. FW-269) is located one mile northwest of Nelson Dewey State Park off

A-3 JAMESTOWN, O'LEARY LAKE



Silty coarse sand (recent fill) , 10YR 3/2

Sand with minor silt, 10YR 4/4, mottling & gleying beginning

Gleyed silt with minor sand, coal cinders observed

Alternating bands of fine sand & silt, gleyed, weakly calcareous. Highly calcareous angular carbonate fragments. Coal cinder fragments observed at 130 cm. & 200 cm.

Sand with minor silt, gleyed, calcareous angular carbonate fragments

Alternating bands of gleyed silts & fine sand, calcareous, angular carbonates observed

Figure 23: Profile, A-3, Jamestown (O'Leary Lake).

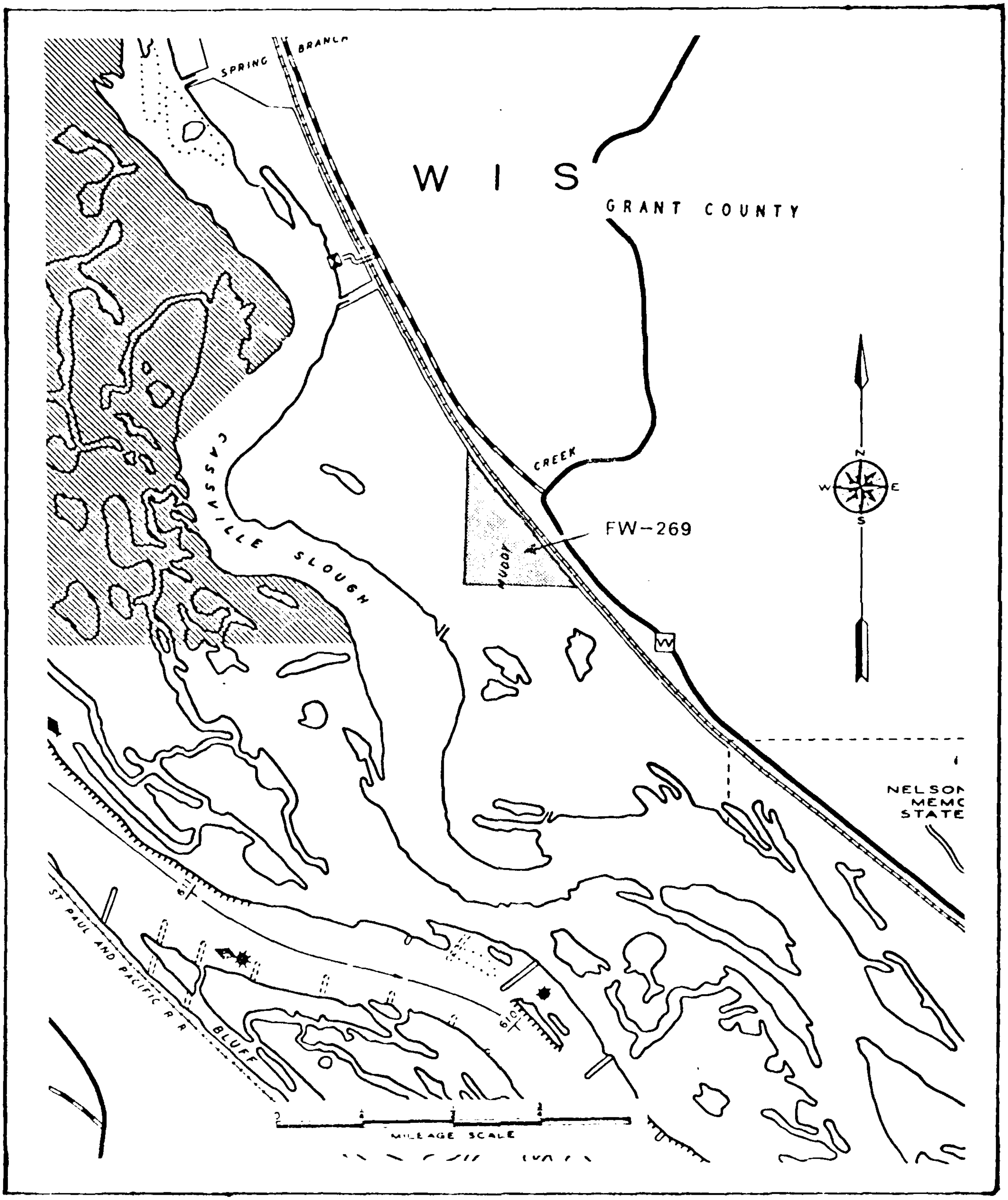


Figure 24: Special Use Area FW-269, Muddy Creek.

State Route VV at river mile 610.7. The tract occupies 36 acres of lowland floodplain between the Chicago, Burlington and Quincy Railroad to the east and Cassville Slough to the west. Cassville Slough is a main channel of the Mississippi River through which runs the Iowa-Wisconsin state line. The average elevation is 610' AMSL. Muddy Creek occupies a valley surrounded by high bluffs east of the project area. Vegetation of FW-269 consists of silver maple and cottonwood with an understory of wood nettle. Muddy Creek is channelized riverward of the railroad tracks and passes through the project area.

Archival Data:

No historic sites have been recorded within or adjacent to the project area. One prehistoric site (47 Gt 26) is located 300m east of the project area and extends for 800m along the south side of Muddy Creek. The only lowland floodplain site recorded in the vicinity lies 500m to the southeast on the lowland floodplain riverward from the railroad tracks. This site is located at the mouth of a small valley occupied by an unnamed stream, a similar environ to FW-269.

Field Investigations:

On 5/17/84 a pedestrian survey along the channelized portion of Muddy Creek was undertaken with negative results. On 6/19/84 coring was conducted with a one inch silt probe to determine the depth of the presettlement surface. Two silt probe cores were taken and the profiles were described. A total of 6 samples were taken from the cores for analysis in the lab. These test holes were placed along the dredge spoil. The resulting profile showed no well defined presettlement horizon. It was determined that at least 2.3m of PSA are present and possibly 4.70m (Figure 25).

Geomorphic Setting and Interpretation:

This channelized tributary stream is located on a low Mississippi river terrace where considerable fine grained vertical accretion deposits have been aggrading the surface. Field observations show that this site is inundated frequently by water and probably for relatively long periods of time. While at the site, our field team experienced the slow but steady rise in the pool causing water from Cassville slough to encroach upon our fieldwork. In this backwater setting, considerable ponding occurs and deposition of generally fine grained sediments has caused accelerated historical aggradation of the surface.

The profile suggests massive siltation has occurred at the site, particularly since no presettlement surface horizon was recognized. There was no evidence of a presettlement subsurface argillic horizon at the site either. In addition, the relatively young forest cover showed root crown burial which also indicates relatively rapid alluviation.

FW-269 MUDDY CREEK

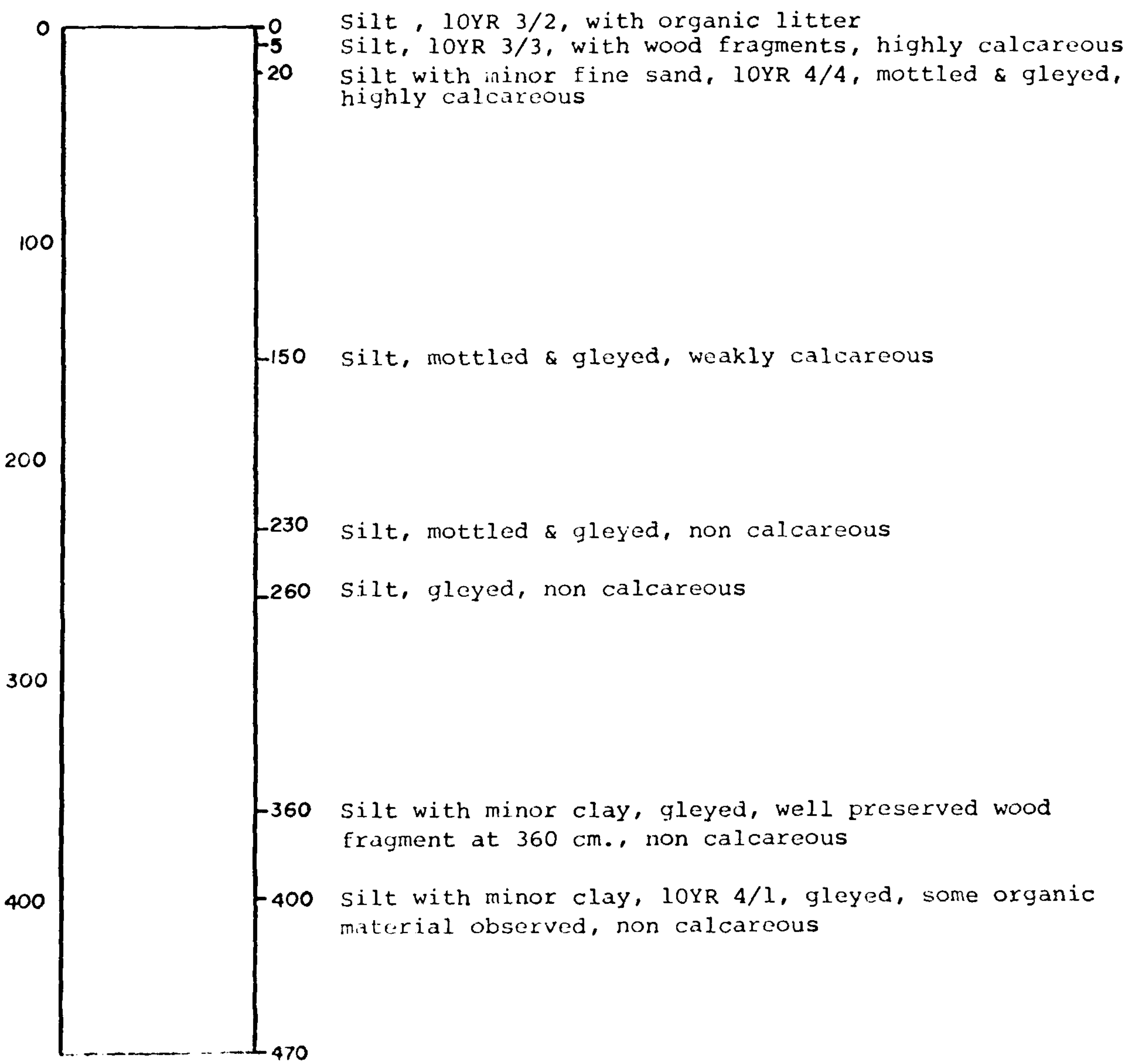


Figure 25: Profile, FW-269, Muddy Creek.

However, the reason behind the absence of calcareous material below 2.3m is unclear. It would appear that if the entire profile consists of only post settlement alluvium, then the deeper units (presumably pre-lock and dam) should have a relatively higher proportion of sediment from Muddy Creek compared to Cassville slough. The Muddy creek sediment would more likely be calcareous since it drains the uplands, while the Cassville material slough may be leached of carbonates since it mobilizes sediments stored in the pool.

Further insight into this problem is provided by the 1940 air photo. The photo shows that the entire site was clear cut and under row crop cultivation. If the site has been under cultivation for a period of several decades or more, then erosion of the organic rich low bulk density surface horizon with subsequent burial of the less obvious lower horizons may have occurred. On the other hand, the observed rapid burial of the approximately 40 year old silver maples could suggest that the presettlement surface may be significantly deeper than the base of the 4.7m profile.

PSA has buried the Muddy Creek site with at least 2.3m. Most evidence indicates that even deeper burial exists, perhaps more than 4.7m, however, all the evidence is not entirely conclusive. Additional field work may be required in order to resolve the questions raised in this discussion.

Results/Recommendations:

Chemical and physical properties of the sediments analyzed at FW-269 indicated at least 2.3m of PSA. Beyond this depth these chemical and physical properties are less dramatic, however, it is possible that the actual depth of PSA is greater than 4.7m. In either case, facilities developments will be unlikely to impact sites of historical or archaeological significance, and, contemporary methods of archaeological survey such as surface collection and shovel probing are virtually useless. If deep excavation is contemplated as an aspect of facilities development, construction should be monitored.

6.7 UNNAMED AREA NEAR JOHN DEERE PLANT FIA 9 AND 16

Location and Landuse: (Figure 26)

Two unnamed tracts, FIA 9 and FIA 16, are located three miles north of Dubuque, Iowa off State Route 386 at river mile 585.7 at the confluence of the Little Maquoketa River and the Mississippi River. These tracts are located below and on a large sand and gravel terrace at an elevation below the maintained pool level to 610' AMSL. These tracts occupy 20 acres between the Chicago, Milwaukee, St. Paul and Pacific Railroad and backwater expanses created by the lock and dam system. The John Deere Plant occupies an extensive terrace southwest of the project areas. Northwest of the project areas the terrace descends to meet the floodplain of

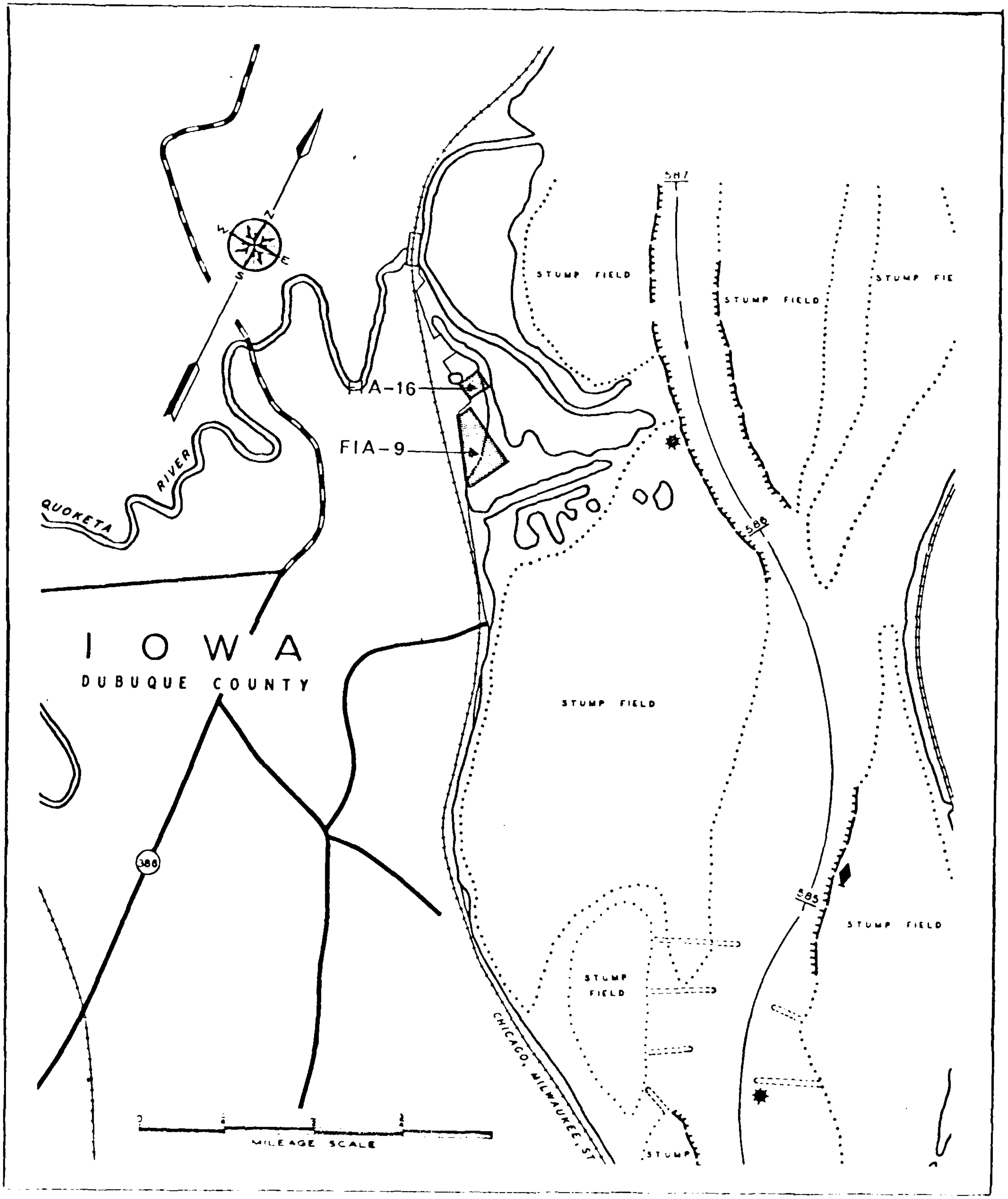


Figure 26: Special Use Areas FIA 9, FIA 16, John Deere Plant Site.

the Little Maquoketa River. Together these various features are known as the Peru Bottom.

Archival Data:

Tract numbers FIA 9 and FIA 16 lie within the townsite of Peru. Peru was founded in 1833, the first year of legal white settlement in Iowa. One prehistoric site, 13 Db 20, has been recorded 1.5km south of FIA 9 on a high terrace.

Field Investigations:

Tract No. FIA-9 was visited on 5/17/84 and again on 6/18/84. The area was below water on both occasions. Revisited on 10/24/84, FIA-9 was still below the maintained pool elevation. Rat houses and emergent aquatic vegetation were present. The area was photographed and no further fieldwork was done.

Tract No. FIA 16 lies east of a large sand pit. It extends eastward across maintained lawns, private residences and gardens on the terrace. Part of the tract extends into a slough farther to the east. On 10/24/84 approximately 6,000 sq. feet of a plowed and rain washed garden were surveyed with negative results. A one inch silt probe was used in hopes of recording a profile, however, out of 4 test holes only one reached a depth of 80cm due to the gravels in the terrace matrix (Figure 27).

Geomorphic Setting and Interpretation:

This site is located on a high Mississippi river terrace composed primarily of outwash sand and pebbles. A nearby abandoned gravel pit shows that the coarse matrix continues to a depth greater than 15m. No PSA was observed in the profile.

The surface horizon extends to about 70cm and is composed of organic rich coarse sand with minor amounts of clay and silt. Beneath this surface horizon is an impenetrable coarse sandy pebbly unit. Little if any Holocene aggradation has apparently occurred at this site which would to preclude the existence of buried surfaces. However, due to the droughty nature of the coarse sediments, eolian reworking may have affected the surface topography of this landscape although direct field evidence supporting this assertion was not observed.

Results/Recommendations:

No meaningful results were recovered from tract FIA-9 as the parcel was submerged during the summer of 1984. In spite of this, other investigations conducted on the Turkey River Bottom indicate substantial depths of pre-settlement alluvium and we predict that the case would be similar at FIA-9. In the event that facilities are planned, it would be appropriate to conduct a field visit to determine the actual depth of PSA at this location.

FIA-16 was subjected to pedestrian survey and no cultural materials were found. The tract is part of a terrace

JOHN DEERE INDUSTRIAL PARK FIA-16

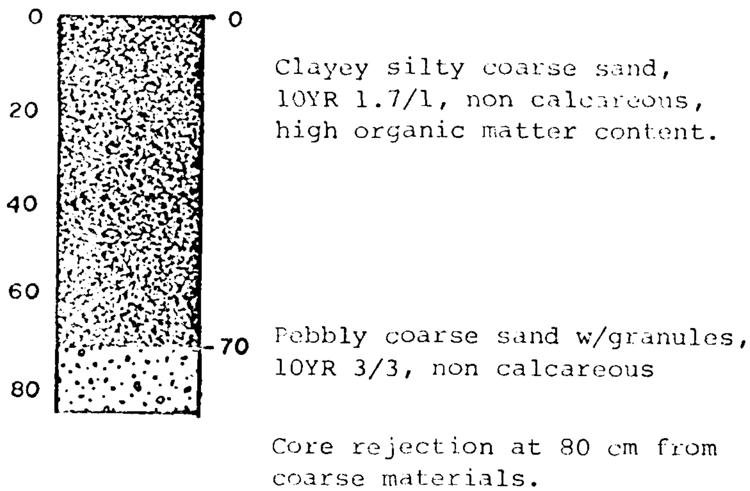


Figure 27: Profile, FIA-16, John Deere Plant Site.

remnant and gravel lag is situated very near the surface. This gravel lag is likely associated with Woodfordian deposition. No further investigations are recommended at FIA-16.

6.8 GUTTENBURG PUBLIC USE AREA FIA-122

Location and Landuse: (Figure 28)

The Guttenburg Public Use Area (tract No. FIA-122) is located within the corporate limits of Guttenburg, Iowa at river mile 614.4. The tract occupies 28 acres of terrace, terrace margin, and lowland floodplain ranging in elevation from approximately 605' AMSL in the lowland floodplain to approximately 625' AMSL on the terrace. Miner's Creek flows through the project area to meet a minor channel or slough which flanks Goetz Island on its west side. This slough empties into the main navigation channel of the Mississippi River at the south end of Goetz Island. West of the project area the sand and gravel terrace extends to the bluffs. Vegetation consists of maintained lawngrass on the terrace to silver maple and willow and emergent aquatic plants on the lowland floodplain below. FIA-122 is riverward of River Park Drive east of U.S. Route 52.

Archival Data:

No prehistoric sites have been recorded on the terrace or in the lowland floodplain within or adjacent to FIA-122. Historic sites include the corporate limits of Guttenberg (map code No. 34). Historic sites north of the project area include an historic structure, a national fish hatchery and aquarium and Lock & Dam No. 10 (map code No's 35, 36, 37).

An interview with an unidentified local resident revealed a prehistoric campsite where Lock and Dam No. 10 joins the terrace 900 meters north of the project area. On August 27, 1984, during the Pool 11 survey, a historic scatter and extensive button blank midden was located across the main navigation channel of the Mississippi River on the west end of the island west of Swift Slough 400 meters south of Lock and Dam No. 10 (13 Ct 213).

Field Investigations:

On 5/16/84 the Guttenberg Public Use Area was first visited. Finding the lowland floodplain under water, a pedestrian survey was carried out along the terrace margin. A historic scatter including button blanks, glass bottle shards, and the bowl of a buff colored kaolin pipe was found. The southern reach to Minor's Creek was grassed over east of a man made levee serving as a road bed for DeKalb Street and River Park Drive. On 6/12/84 during a lower river stage the lowland floodplain was surveyed combining pedestrian survey and coring. Another scatter of button blanks from the button industry was located on the lowland floodplain. Four test holes were placed in an east west transect across the lowland to determine the depth of the

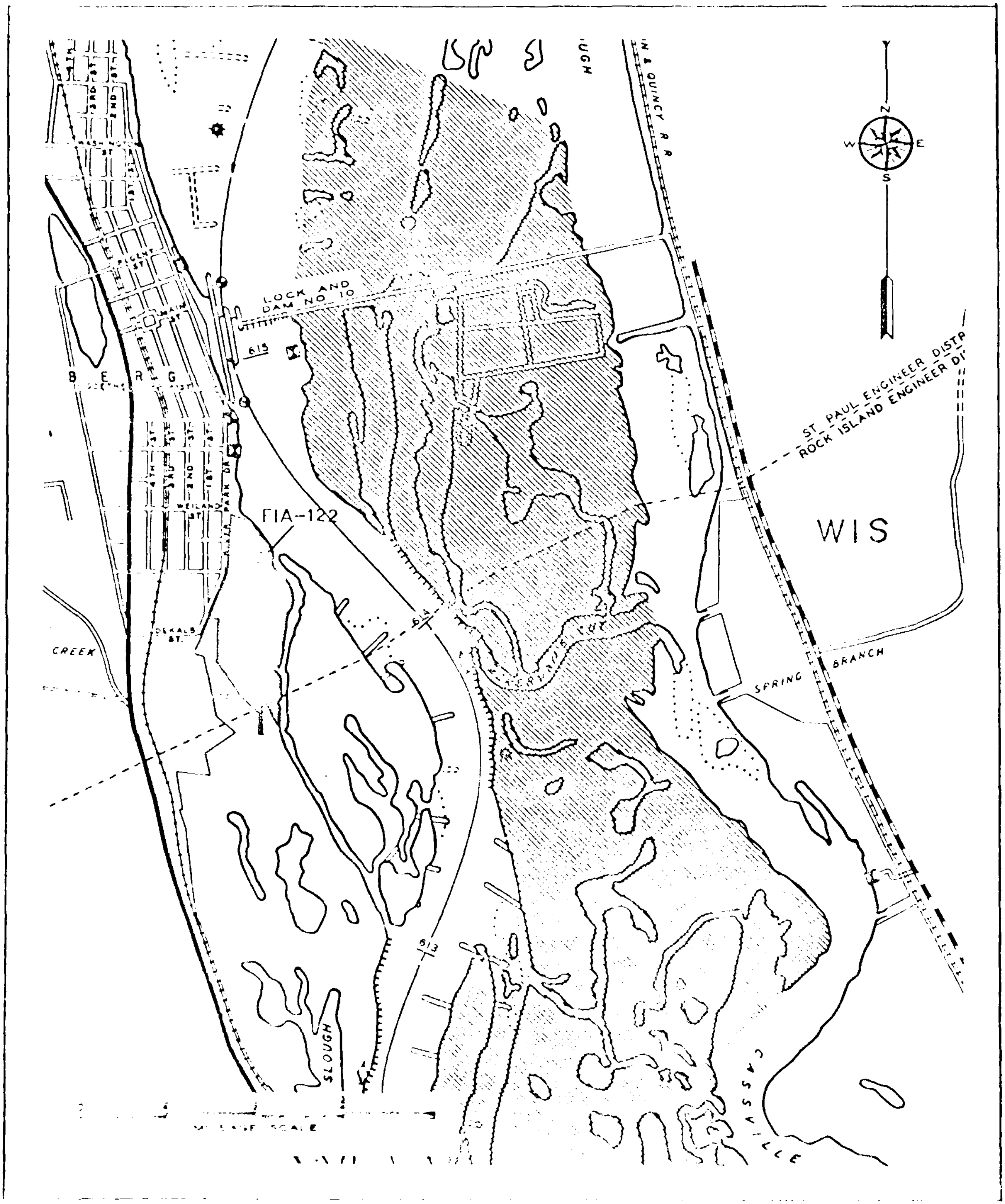


Figure 28: Special Use Area FIA-122, Guttenberg.

presettlement surface using a one inch silt probe. The resulting profile shows historic alluvium to a minimum depth of 4.0m. The probe was refused at this point (Figure 29). The four silt probe cores were described and four samples were taken.

Geomorphic Setting and Interpretation:

This site is located on a low Mississippi river terrace adjacent to the major channel of the river. Rapid vertical accretion of silt and organic material overlies coarser grained deposits at this site. The relatively young forest cover apparently is very effective in causing rapid alluviation since considerable flood debris is trapped on the surface of the site. The profile analysis reflects several individual alluvial episodes occurring in the form of abrupt textural discontinuities of varying thickness. No presettlement surface or subsurface horizon was identified in any of the four cores, which suggests that at least 4m of PSA exist at the site.

Additional evidence illustrating historical alluviation includes procurement of an iron enriched (possibly taconite) pellet found at 54cm and a piece of glass found at 58cm below the surface. Considerable fresh wood fragments are observed throughout the entire 4m profile. Furthermore, the profile contains carbonate material which is usually associated with historical alluvial units. A comparison of the 1940 and 1961 series air photos shows an appreciable amount of made land in the area of the site as a result of progressive surface aggradation. Due to the relatively deep historical alluvial fill encountered at this site, the probability of intact prehistoric cultural contexts near the present surface is remote.

Results/Recommendations:

The shell button industry midden located at FIA-122 is a large site with dense concentrations of historic debris. Now designated as 13 Ct 218, this site is of considerable potential significance not only to interpreting the development of the community of Guttenberg, but, also, to understanding the technical aspects of an important regional late 19th century industry. Prior to activities that would result in destruction of the archaeological resources, the pearl button industry component at 13 Ct 218 should be evaluated with regard to eligibility for The National Register of Historic Places.

The geomorphic contexts at this locality are complex. At least 4.0m of PSA have been deposited. Thus, it is possible that 13 Ct 218 harbors deeply buried components from both historic and prehistoric eras. Logistically, it may not be feasible to excavate to a depth that would encompass the entire Holocene matrix. To do so would minimally require dewatering equipment, protective shoring, and other technical support not usually associated with archaeological investigations.

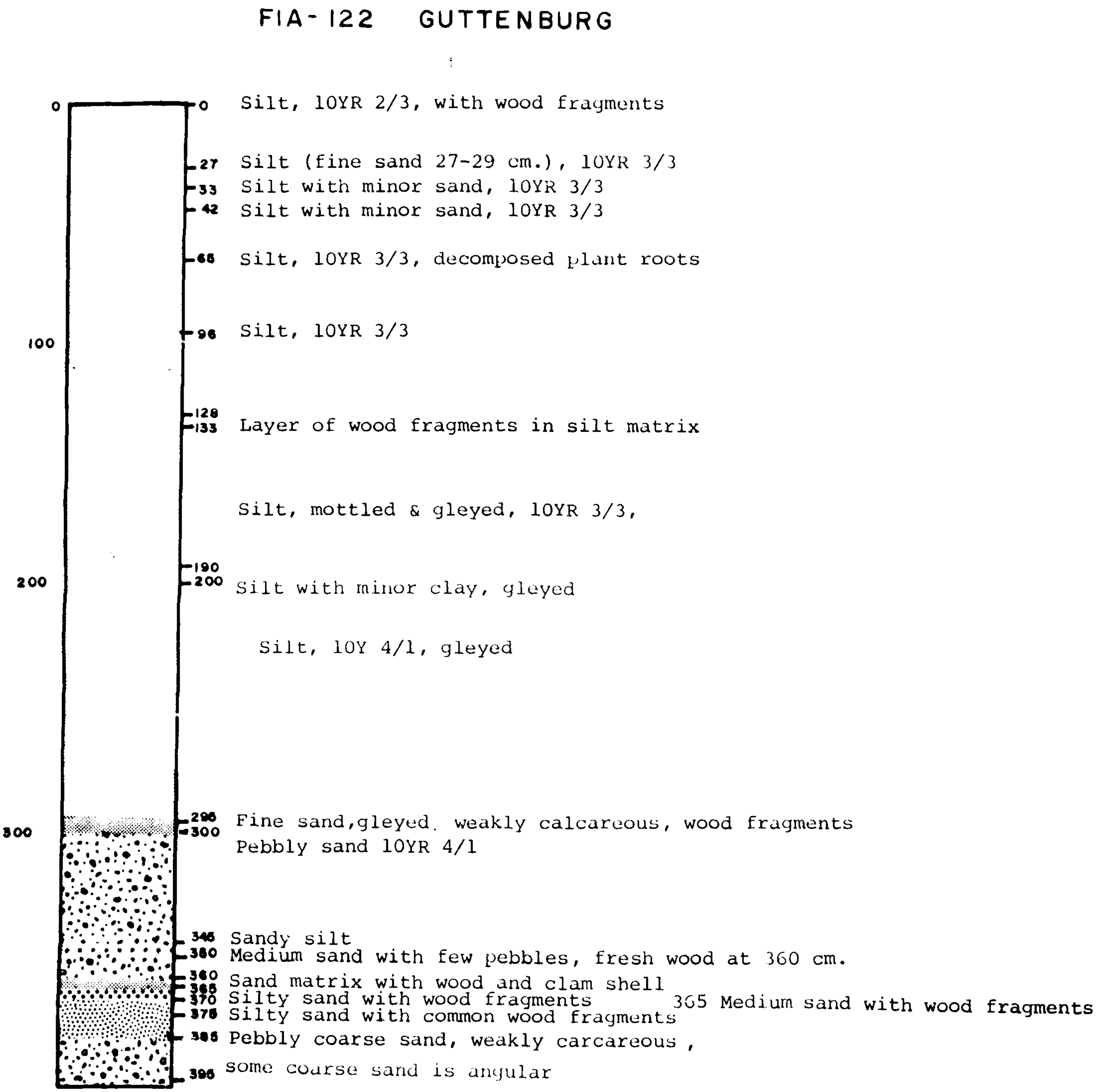


Figure 29: Profile, FIA-122, Guttenburg.

6.9 ANTHONY'S RESORT FIA-66

Location and Landuse: (Figure 30)

Tract No. FIA-66 is located riverward of Anthony's Resort at Waupeton, Iowa at river mile 599.8. It occupies a narrow three acre strip of land riverward of the Chicago, Milwaukee, St. Paul and Pacific Railroad at an elevation of approximately 605' AMSL at the confluence of Waupeton Creek and the main channel of the Mississippi River. South of the elevated railroad bed is a small valley occupied by an intermittent stream entering from the southwest and Waupeton Creek entering from the south. This small valley's landscape has been altered for permanent and seasonal homes and trailers. Ponds have also been dug and the streams have been channelized. Bluffs rise sharply south of the railroad bed and from the small valley floor. Anthony's Resort is accessible via a north turn, off Balltown Ridge, near the Dubuque-Clayton County line at Old Balltown.

Archival Data:

Waupeton (map code No. 17) was a river hamlet and railroad depot as well as a commercial center for shipping agricultural goods to market. No prehistoric sites have been recorded on the lowland floodplain of the Mississippi River or its associated terraces on or adjacent to the project area. However through an interview with the resort owner, it was earned that in the summer of 1962 a professor from the University of Southern California excavated a couple of mounds on the blufftop immediately west of the Anthony's Resort buildings. No artifacts were reported by the resort owner as coming from the project area or the valley.

FIA-66 was visited on 5/30/84 and 6/13/84. No work could be done because the high river stage had inundated the area. On 10/24/84 the area was investigated. West of the railroad bridge the rock from the railroad bed covered the shore leaving no exposed areas. East of the bridge ca. 100m there was an area of silver maple stumps 8" - 20" in diameter riverward of the railroad bed where a one inch silt probe was employed to determine the depth of the presettlement surface. Several probes met refusal at ca. 50cm due to wood or gravel. The deepest probe reached a depth of 4.85m (Figure 31) before refusal due to bedrock or a large boulder. The presettlement surface was present at an approximate depth of 2m. One complete silt probe core was taken, two samples were taken, and the profile was described and photographed.

Geomorphic Setting and Interpretation:

The site is located on a tributary terrace overlying a limestone bench and is abutting the main Mississippi river channel. As a result of pool impoundment, this site is frequently under water. When visited in May, June, and July the site was found to be inundated.

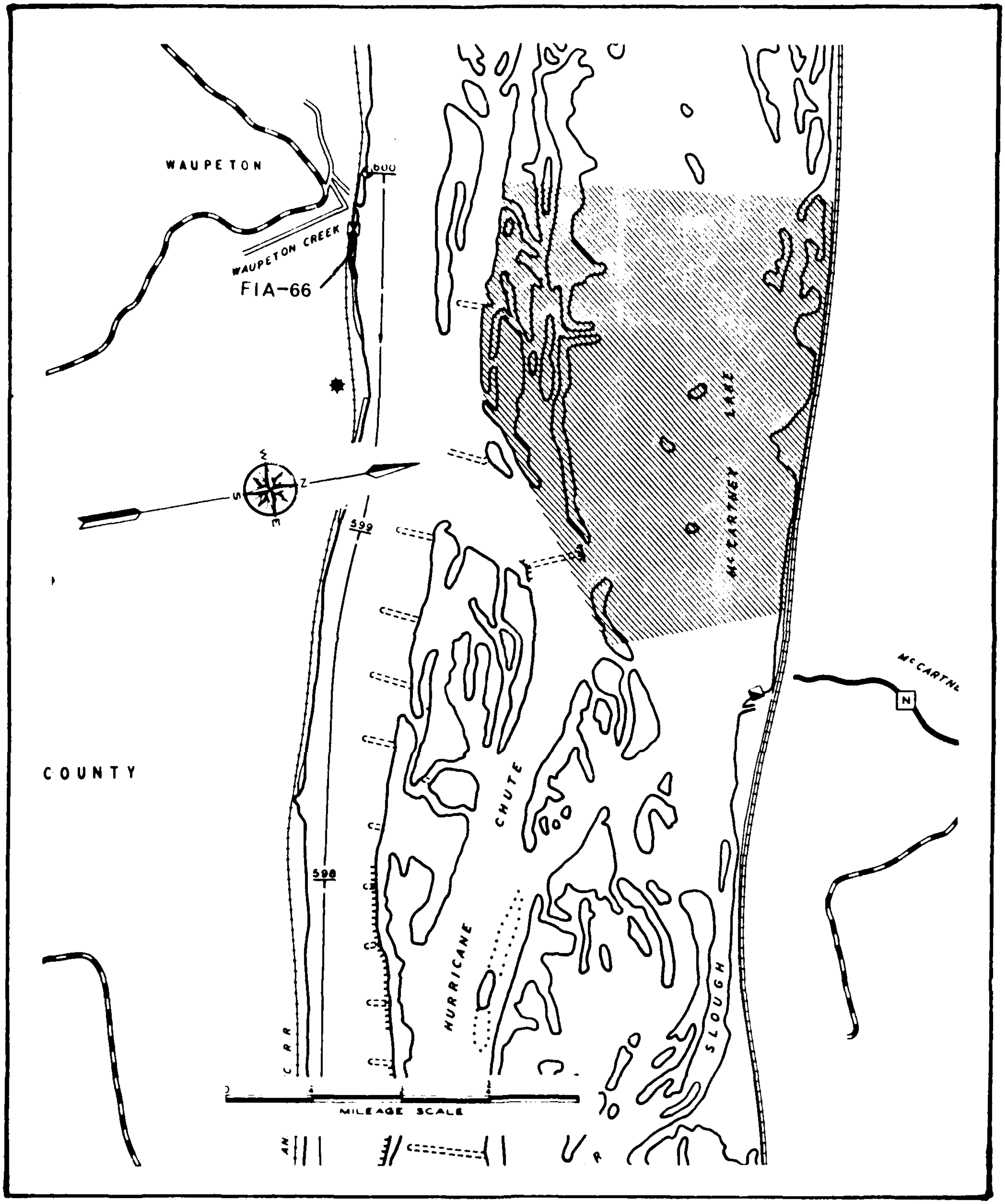


Figure 30: Special Use Area FIA-66, Anthony's Resort.

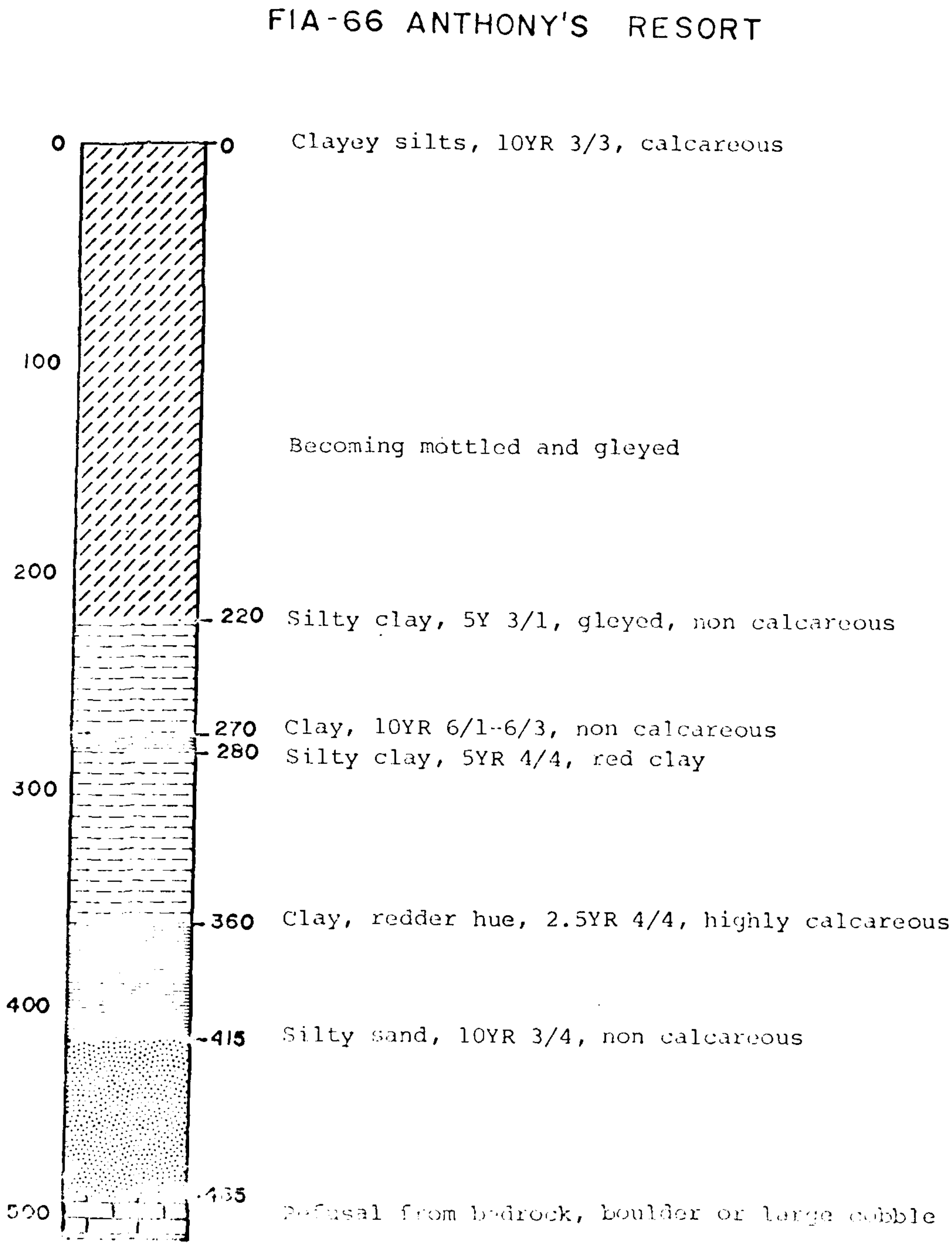


Figure 31: Profile, FIA-66, Anthony's Resort.

Due to the rip-rap and railroad grade construction materials, we were unsuccessful on several attempts to penetrate the gravelly, bouldery lag seen at the surface. A fourth attempt proved successful and we were able to extract a core to a depth of 4.85m.

The surface 2.2m is composed of vertically accreted silt and clay deposits which show no soil development. In addition to lacking soil development, this historical surficial unit is calcareous. The lower units seem to have a more obscure erosional and depositional history.

The profile taken from the one silt probe core did not show obvious soil horizons below the more apparent surface unit. Abrupt contacts were observed between units that varied in color and texture, instead of gradual boundaries often associated with pedogenic development. The close proximity (within 10m) and disturbance from the railroad grade may be responsible for the suite of alluvial units seen lower in the profile and for the refusal occurring at the base of the profile.

The profile illustration shows at least 2.2m of PSA. However, due to the lack of observed pedogenic horizons from being located adjacent a railroad grade and from abrupt alluvial contacts, historical disturbance may extend much deeper. Additional cores should be taken in order to resolve questions regarding the genesis of the lower alluvial units.

Results/Recommendations:

Archaeological survey revealed no evidence of historic or prehistoric occupation which is not surprizing given the depth of recent sediments which averages 2.0m. Because of this depth, facilities development is unlikely to intrude upon the presettlement surface. If such deep excavation is considered as a part of construction, these activities should be monitored.

6.10 FURNACE BRANCH PUBLIC USE AREA FW-262

Location and Landuse: (Figure 32)

The Furnace Branch public use area, tract No. FW-262, is located between the Nelson Dewey Power plant and Cassville, Wisconsin at river mile 607.3. The 20 acre tract is bordered on the northeast by the Chicago, Burlington and Quincy Railroad and on the southwest by the main channel of the Mississippi River. The Cassville terrace extends 200m landward of the railroad tracks before meeting high bluffs. The Furnace Branch descends a valley from the north and bisects the sandy terrace and the project area. The stream is channelized from the railroad tracks to its confluence with the Mississippi River. FW-262 ranges in elevation from below 605' AMSL on the lowland floodplain to 610' AMSL on the sandy terrace.

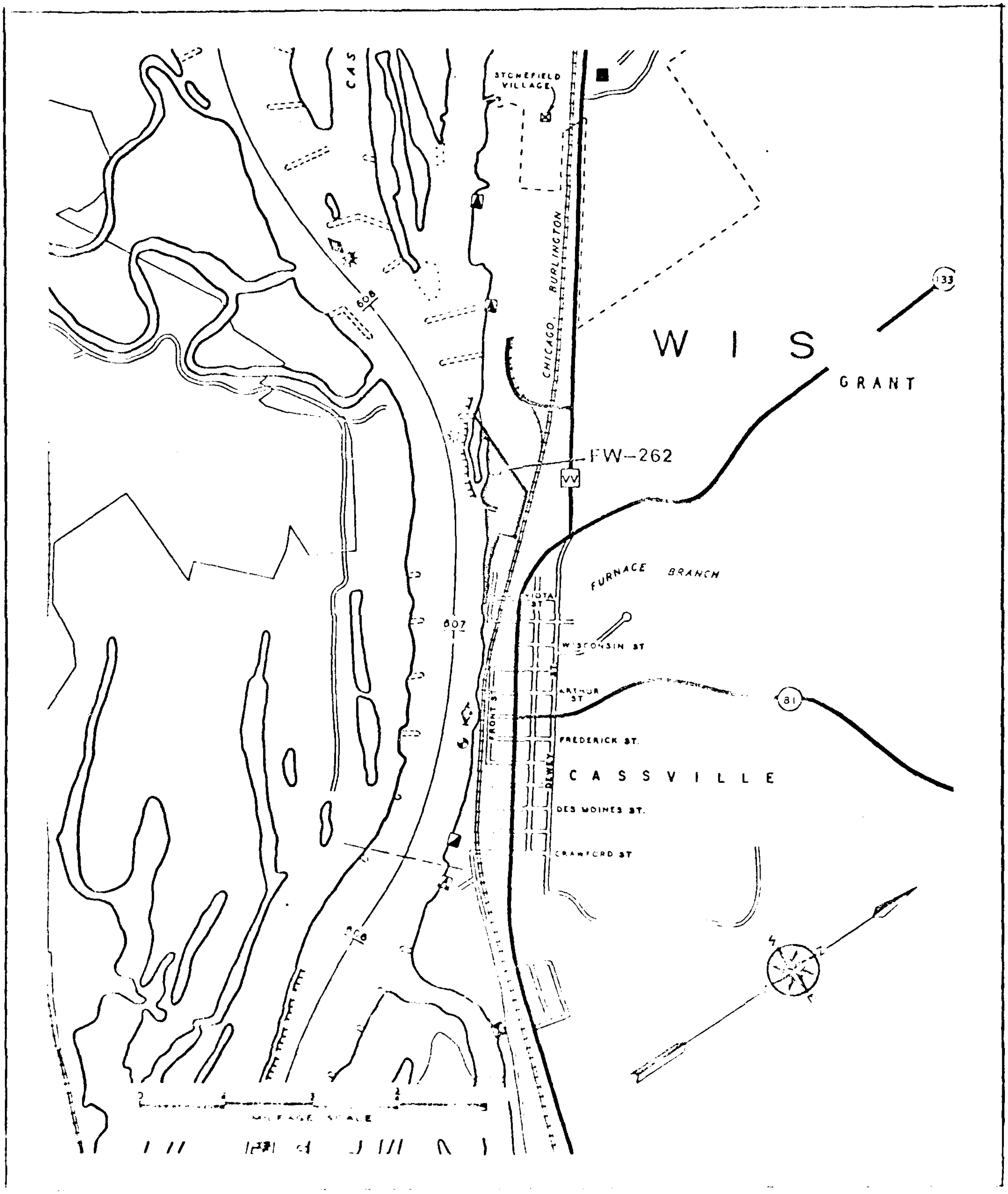


Figure 32: Special Use Area FW-262, Furnace Branch.

Vegetation on the lowland floodplain consists of silver maple 4" - 48" d.b.h. and elm 6" - 8" d.b.h. with a sparse understory of silver maple seedlings, young silver maple and elm. Patches of cordgrass grow on the open slough and river banks. The terrace northwest of the Furnace Branch is occupied by a grove of white and red pine with an understory of woodnettle, mulberry and various shrubs. Southeast of the Furnace Branch the terrace is developed above the sandy foreshore where a narrow strip of the project area extends to the southeast.

Archival Data:

No previously recorded sites are reported for this location.

Field Investigations:

On 5/17/84 a pedestrian survey was conducted along uninundated erosional cutbanks northwest of the channelized Furnace Branch on the terrace margin and southeast of the Furnace Branch on a narrow strip of dredge spoil. Chert flakes and shatter were found in both locations. In addition a shell midden was exposed approximately 50m from the mouth of the stream on the southeast side. Red brick, large limestone blocks and refuse on the terrace margin northwest of the Furnace Branch was also found, indicating the presence of a homestead.

On 5/29/84 FW-262 six excavation tests were made along the terrace margin northwest of the Furnace branch. Three tests contained chert waste flakes and one Late Woodland sherd indicating prehistoric occupation along the terrace margin. Coring was not employed since artifacts were being recovered near the ground surface within and just below an assumed plowzone. One chert Kramer point and more chert flakes were found on subsequent visits to the area in search of more diagnostic material. Kramer points are indicative of the Early Woodland period.

On 8/15/84, during a lower river stage, more exposed erosional surfaces along a small slough riverward of the terrace were surveyed with negative results.

On 10/26/84 a stretch of beach approximately 300m long between the Cassville Terrace and the main channel of the Mississippi River was surveyed. A third site was found on the sandy foreshore between 300 and 380m southeast of the mouth of the Furnace Branch. One stemmed chert projectile point with the blade reworked to a drill was found along with a historic scatter. A shell midden is visible near the foot of the cut bank. Also, a one inch silt probe was used to determine the depth of the presettlement surface on the lowland floodplain below the terrace and northwest of the Furnace Branch. The profile obtained shows a presettlement surface at 2.60m (Figure 33). The probe reached a depth of 4.80m before refusal due to gravel and coarse sand.

FW-262 FURNACE BRANCH

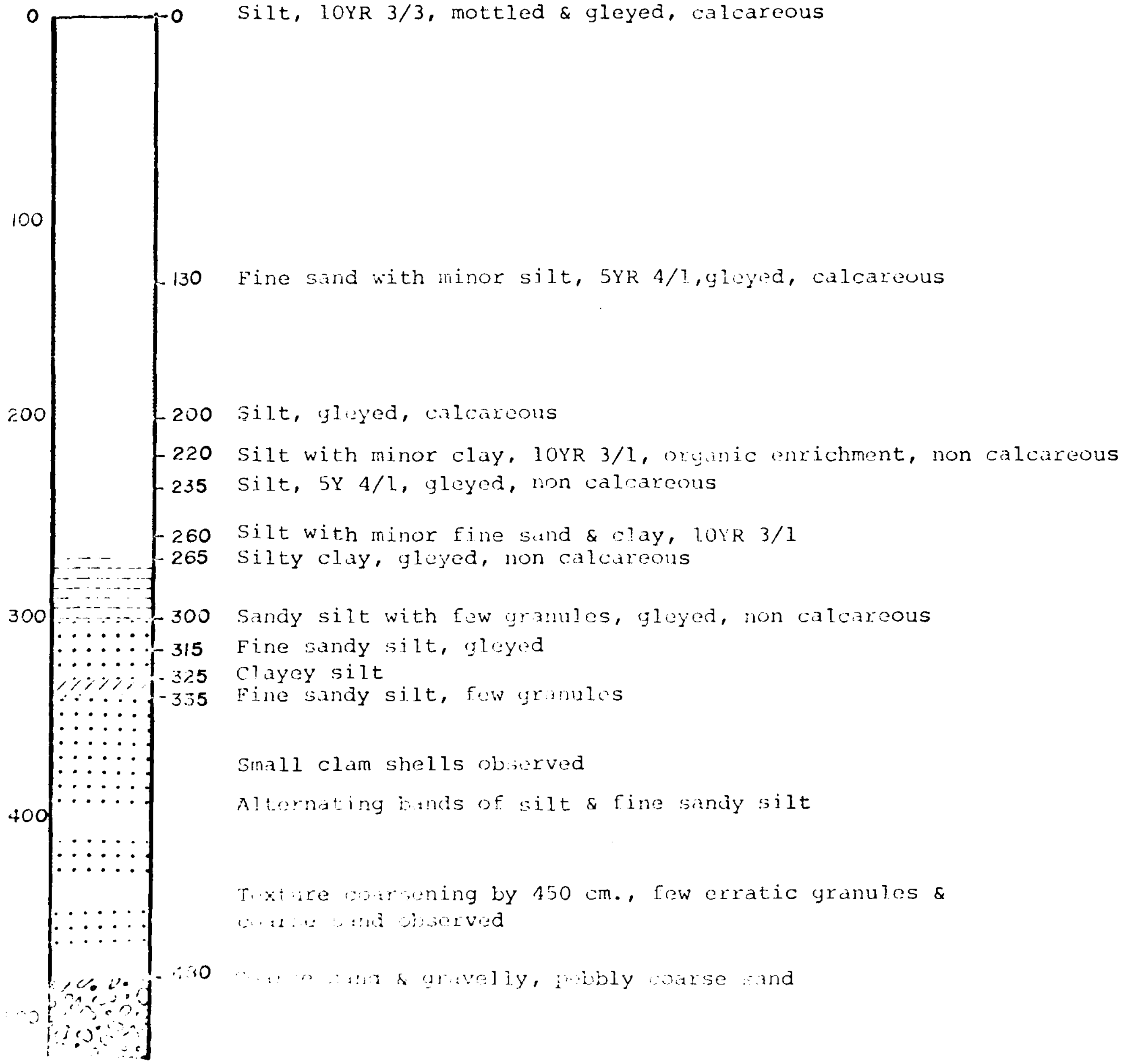


Figure 33: Profile, FW-262, Furnace Branch.

Geomorphic Setting and Interpretation:

The site is located in a tributary floodplain adjacent an older, higher Mississippi terrace. A few slightly higher tributary terrace outliers abut the older, higher surface. The present stream course has been channelized but the site chosen for coring is adjacent to the former natural channel. The older Mississippi terrace is about 4m above the present floodplain surface suggesting the tributary channel has incised the higher terrace surface. The site is within 50m of the constricted Mississippi river channel.

This location has experienced about 2.2m of PSA. The presettlement surface shows organic enrichment and is leached of carbonate material which is unlike the overlying calcareous units. Another weak surface is expressed at 2.6m, however, the development of subsurface pedogenic horizons was not observed.

The remainder of the profile shows a complicated history of point bar and channel fill deposits which indicates that the Furnace Branch floodplain has experienced reworking at least once and possibly several times during the Holocene. Meander scars are seen in the area close to the site which further suggests lateral migration and reworking of the tributary floodplain sediments. The basal component of the profile is a gravelly, pebbly, coarse sand unit considered to be outwash material. This component may simply be mobilized sediment from the older terrace above, although the evidence is not conclusive.

The potential for discovering cultural provenance may be relatively good below the PSA where the two presettlement surfaces were observed. Below these two surfaces, active lateral channel migration appears to have characterized at least part of the Holocene and has precluded surface stability. Prehistoric deposits located stratigraphically in the lower alluvial units may represent a reworked and disturbed component. In contrast, slightly higher tributary surfaces abutting the older higher Mississippi terrace were shown on the 2' contour interval 1943 topographic map. Sites such as these may provide a more complete Holocene record and should be explored.

Results/Recommendations:

The Furnace Branch Public Use Area incorporates two distinct geomorphic contexts, a terrace margin and a segment of lowland floodplain. On the terrace a site of potential significance including historic debris and Late and Early Woodland materials was encountered. The date of the shell midden could not be ascertained due to a lack of diagnostic artifacts in direct association. Should future developments on the terrace unit be contemplated, the site now designated at 47 Gt 417 should be evaluated to determine eligibility for the National Register of Historic Places.

At the confluence of the channelized Furnace Branch and the main channel of the Mississippi River, the context of cultural materials is not well understood. Dredging has clearly translocated some artifacts as flakes and shatter

were noted atop the dredge spoil. A shell midden is visible in the cut-bank on the southeast side of the stream, approximately 50.0m from the mouth during low water levels. However, northwest of the mouth of the creek, coring demonstrates a pre-settlement surface at a depth of 2.6m. While at a depth of 4.8m the Late Woodfordian surface is encountered. We interpret this as one of the localities crucial to understanding the evolution of the floodplain. The following scenario serves to describe the events. During the early-middle Holocene, the floodplain began a long period of aggradation. At a point in time, presently unknown, the floodplain and its associated fine grained sediments began to capture or encroach on the terraces. Thus, occupied localities once well elevated, dry settings, were incorporated within the lowland floodplain. We would expect that later occupations, e.g., Woodland, are associated with the floodplain environment. However, earlier occupations, e.g. Archaic, are associated with the now obscured terrace environment.

The potential of this site for aiding in the development of sediment chronology is high. As a result, we recommend that prior to any construction activities on the floodplain, the site now designated as 47 Gt 416 be evaluated for eligibility for the National Register of Historic Places.

6.11 THE POTOSI CANAL RECREATION AREA WIS-13

Location and Landuse: (Figure 34)

The Potosi Canal Recreation Area is located riverward from Potosi Station, Wisconsin at river mile 591.9. It occupies 10 acres most of which has been underwater since the installation of the lock and dam system in the mid 1930's. The northwestern portion borders on a road which follows the dredge spoil from the Potosi Canal. Emergent aquatic plants are present and the area has many muskrat houses. Local residents fish from the road and use the boat landing at the road's end. This road passes beneath the Burlington Northern Railroad and joins State HWY 133 at Potosi Station. North of the tracks the bluffs rise sharply on either side of a long valley occupied by Potosi Station and Potosi. The present mouth of the Grant River lies less than one mile northwest of WIS-13. Before the lock and dams, the Grant River flowed through the project area.

Archival Data:

The townsite of Layfayette borders WIS-13 to the north (map code #51). This was a steamboat landing in the 1830's and 40's. It was also known as the Port of Potosi. The Potosi Canal borders WIS-13 to the west (map code #50). Construction began on the canal in 1846.

Previous surveys in the area include Miller (1932: 64), Geier and Loftus (1975, 1976), and Gallagher (1980), plus the Charlie Brown Atlas (SHSW). Five prehistoric sites have

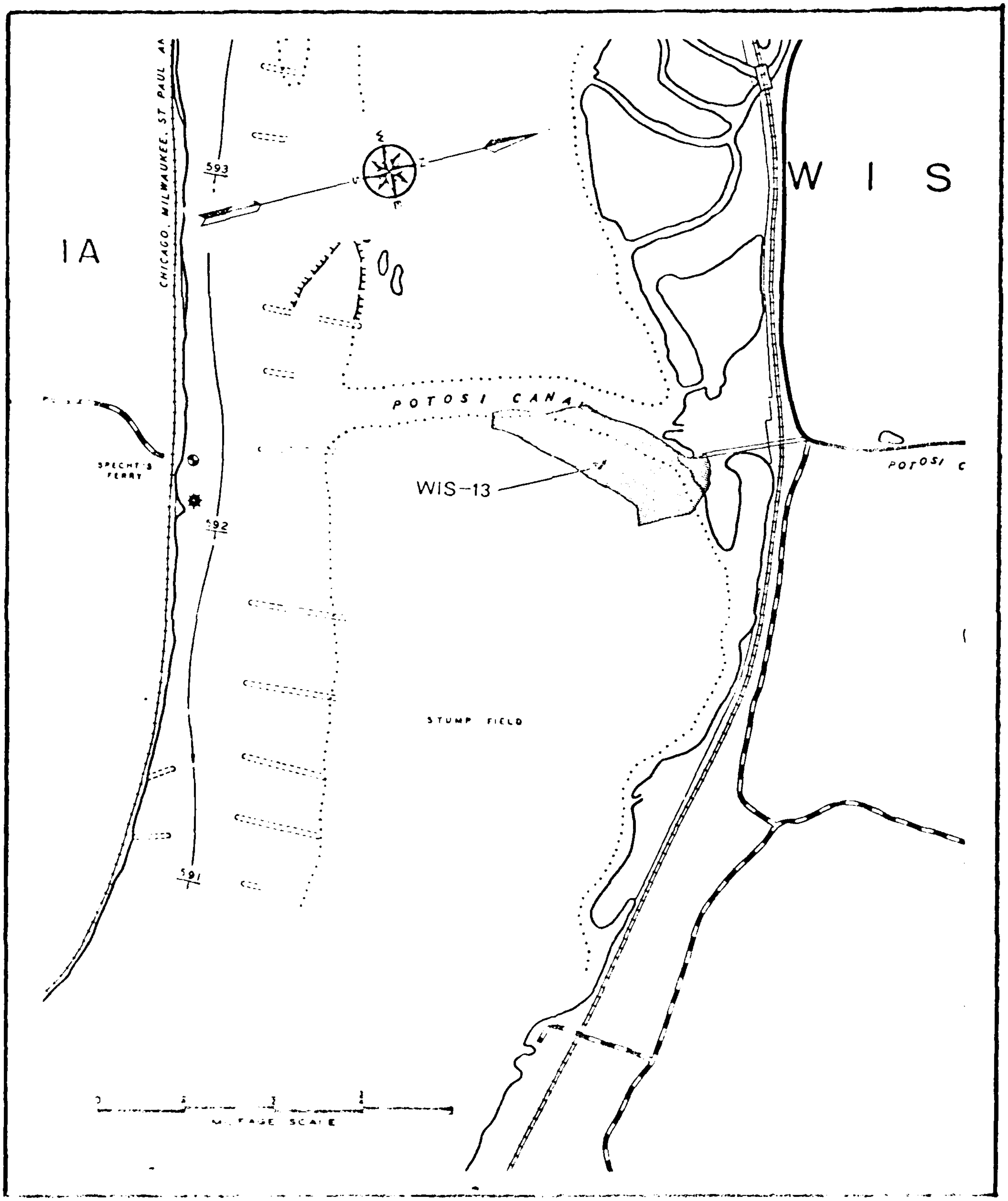


Figure 34: Special Use Area WIS-13, Potosi Canal.

been reported within one km of WIS-13. Included are 47 Gt 376, 47 Gt 94, 47 Gt 225, and two Charles E. Brown Atlas sites with no codification numbers. Three of these sites are located on the lowland floodplain adjacent to the project area and are underwater. Many prehistoric sites have been recorded on the Potosi terrace to the southeast and above the present mouth of the Grant River.

Field Investigations:

Since no erosional features were visible in the project area, pedestrian survey was of limited use. An area was selected for coring and shovel testing south of the railroad tracks and west of the gravel road. This area, although slightly north of the project area was thought to be the least disturbed. The selected area was an open grassy area with willow saplings, trisquan, cattails and canary grass. On 5/28/84 shovel testing was attempted with negative results due to the high river stage. Water on the surface and saturated matrix made testing to sufficient depths impossible. Shovel probe holes would rapidly fill with water and the matrix could not be screened. On 6/20/84 a one inch silt probe was used to determine the depth of the presettlement surface. The results of test hole No. 1 (Figure 35) show an area of relatively little post settlement alluviation. Although not well defined, it appears that presettlement sediments occur within 50cm of the surface. Two samples were taken for lab analyses.

Geomorphic Setting and Interpretation:

This site is located on an alluvial fan which overlies a low Mississippi terrace. The deposits are primarily composed of vertical accretion silts with historical alluvium capping the surface. A surface horizon about 10cm thick is developing in the PSA.

The post settlemei t material extends down to 60cm and is characterized by laminated flood deposits varying in thickness. These deposits are calcareous and range in texture from fine sand to silt.

A sharp contact occurs between the post settlement and pre-settlement material where a pronounced change in soil color can be observed. The presettlement surface horizon is well expressed with a black (10YR 1.7/1) color which continues to 1.20m. The well developed mollic epipedon is composed primarily of silt which grades into a finer textured subsurface horizon. Finally, the base of the profile shows a coarsening in texture with an increase in the silt fraction. No other surface horizons were observed in this profile. However, additional surfaces lower in the stratigraphic column may exist.

Results/Recommendations:

Results from this reconnaissance were equivocal. Shovel testing was conducted on the northern margin of the site, and, because of the saturated ground, presettlement

POTOSI CANAL

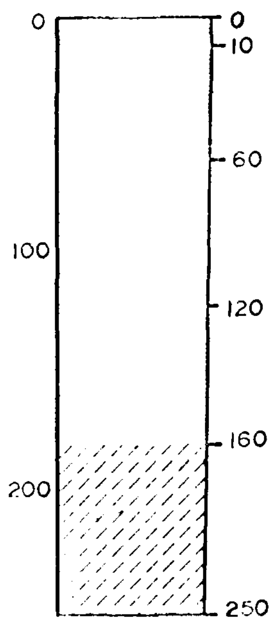


Figure 35: Profile, WIS-13, Potosi Canal.

surfaces were not adequately investigated. There appears to be little PSA at the north segment of WIS-13, however, we have no data from the low-lying portions of the special use area.

Of importance here is the information provided by the firm of Howard Needles Tammen and Bergendoff (HNTB) in 1974 for the preparation of the Environmental Impact Statement for Navigation Pool 11. Section 2.22 indicates an archaeological site coincident with WIS-13. However, archives and site files at the State Historical Society of Wisconsin provide no information with regard to this site. Attempts to clarify this problem with Mr. Charles Causier and Mr. Richard Sinclair of HNTB were negative. The correspondence file of the 1974 EIS includes only correspondence from the State Historical Society which references a map provided by SHSW to HNTB. Two alternatives are possible. Either the site files were modified since the data were provided to HNTB in 1974 and the site is no longer listed, or, HNTB may have placed the site in the wrong location.

Our investigations, impeded by high water, failed to resolve the problem. As a result, and influenced by the dense concentration of sites at this locality, it is recommended that any future construction at WIS-13 be monitored.

6.12 WOLFE CREEK COMMERCIAL RECREATION AREA FIA-109 & FIA-111

Location and Landuse: (Figure 36)

The Wolfe Creek Commercial Recreation Area, tract no.'s FIA-109 and FIA-111, occupies one acre of lowland floodplain on the southwest side of the main navigation channel of the Mississippi River at river mile 612.3 approximately 1.5 miles south of Guttenberg, Iowa off U.S. Route 52. Elevation is 605 to 610' AMSL. Turkey River Mounds National Monument and the confluence of the Turkey River and the Mississippi River lie three miles to the southeast. Both FIA-109 and FIA-111 are located on a narrow strip of lowland floodplain riverward of the Chicago, Milwaukee, St. Paul and Pacific Railroad. The railroad bed hugs the foot of the bluffs which rise sharply and are disected by a few small intermittent streams. FIA-109 is located southeast of the present boat landing and consists of a 5m strip of land and a wingdam remnant. This shoreline is gravel and limestone with a few scattered small silver maples, 3-15" d.b.h. FIA-111 lies northwest of the boat landing below Goetz Slough and between two wingdam remnants. Vegetation consists of silver maple 4-20" d.b.h. and willow 12" d.b.h. with an understory of woodnettle and silver maple.

Archival Data:

No historic or prehistoric sites have been recorded on the lowland floodplain of the Mississippi River or on its

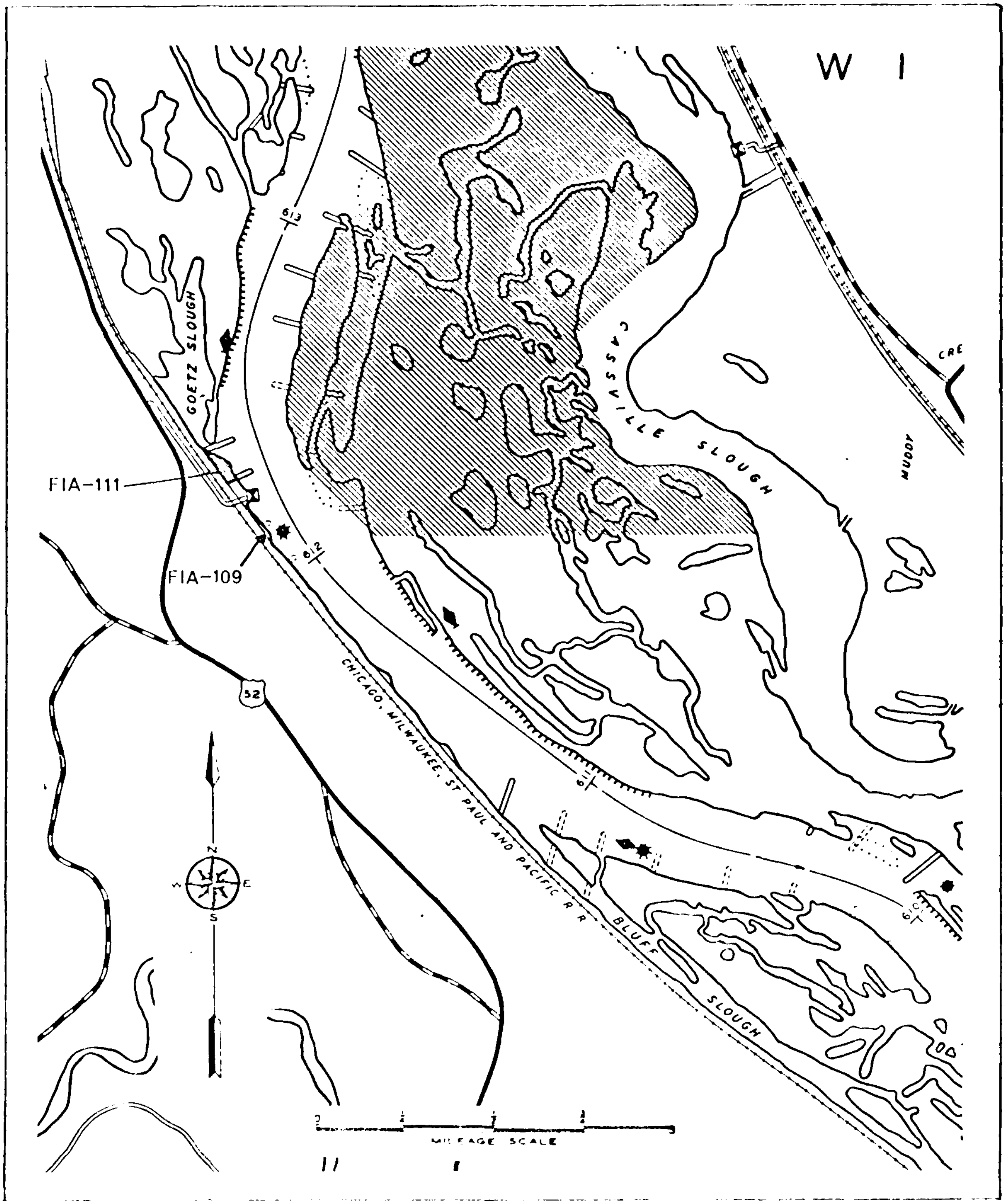


Figure 36: Special Use Areas FIA-109, FIA-111, Wolf Creek.

associated terraces on or adjacent to tracts FIA-109 and FIA-111.

Field Investigations:

The Wolfe Creek Recreation Area was visited on 5/16/84 and 6/13/84, but the high river stage had inundated the project areas. Survey investigations were conducted on 9/12/84, and 10/24/84. Both FIA-109 and FIA-111 were surveyed, as was the area between the two tracts. To supplement pedestrian survey, coring was conducted with a silt probe to determine the depth of the presettlement surface. Two silt probe cores were taken and the profiles were described. Some cut and fill activities were associated with railroad bed construction, and coring often resulted in bit refusal due to buried limestone and gravel rubble. FIA-109 is substantially more disturbed than FIA-111 and the depth of the presettlement surface could not be determined at the former locality. The deepest core at FIA-111 was 2.95m below the surface. The profile (Figure 37) demonstrates historical alluvium to a depth of 2.75m.

Geomorphic Setting and Interpretation:

This site is located on a tributary alluvial fan adjoining the main Mississippi river channel. Historical vertical accretion deposits bury the fan surface. The origin of the deposits is from the upslope steep valley wall, from the nearby railroad grade, from the main river channel, and the basal gravel lag which is probably from the nearby wing dam structure. The entire profile represents alluviation from historical deposits and shows no evidence of pedogenic development, but instead shows flood laminae each a few centimeters thick and composed of sand, silt, and clayey silt. Leaching of carbonates which indicates soil development has not occurred because the entire profile is calcareous. From the field investigations the evidence tends to deny the existence of cultural context at least to a depth of 3m.

Results/Recommendations:

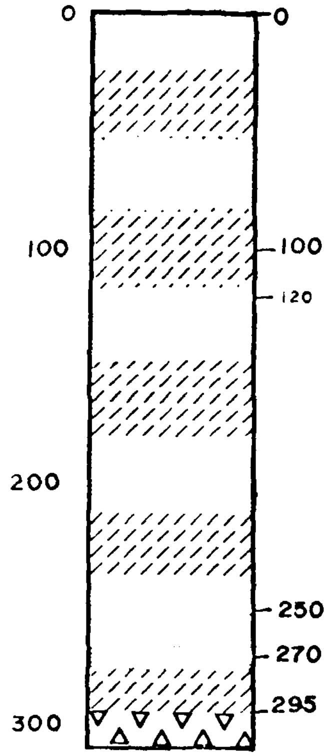
No potentially significant cultural resources were encountered at either FIA-109 or 111, largely a function of previous fill activities and/or the depth of post-settlement alluvium. If disturbance from facilities development is planned for depths that exceed 2.75m, construction monitoring should be implemented.

6.13 McCARTNEY LAUNCHING AREA FW-208

Location and Landuse: (Figure 38)

The McCartney Launching Area, tract no. FW-208, is located at the confluence of the McCartney Branch and the backwaters of the Mississippi River at river mile 598.4 just south of McCartney, Wisconsin. FW-208 covers four acres of

FIA-111 WOLF CREEK



FIA-109 WOLF CREEK

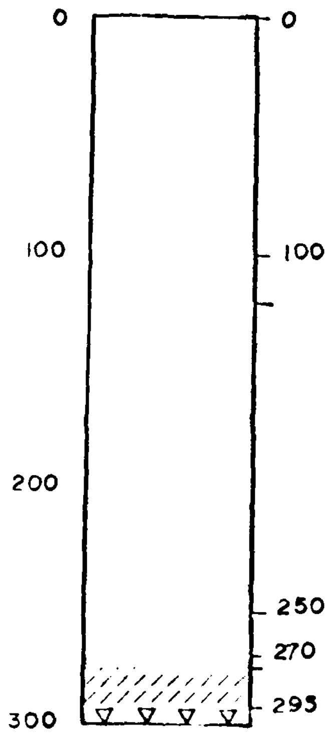


Figure 37: Profiles, FIA-109, FIA-111, Wolf Creek.

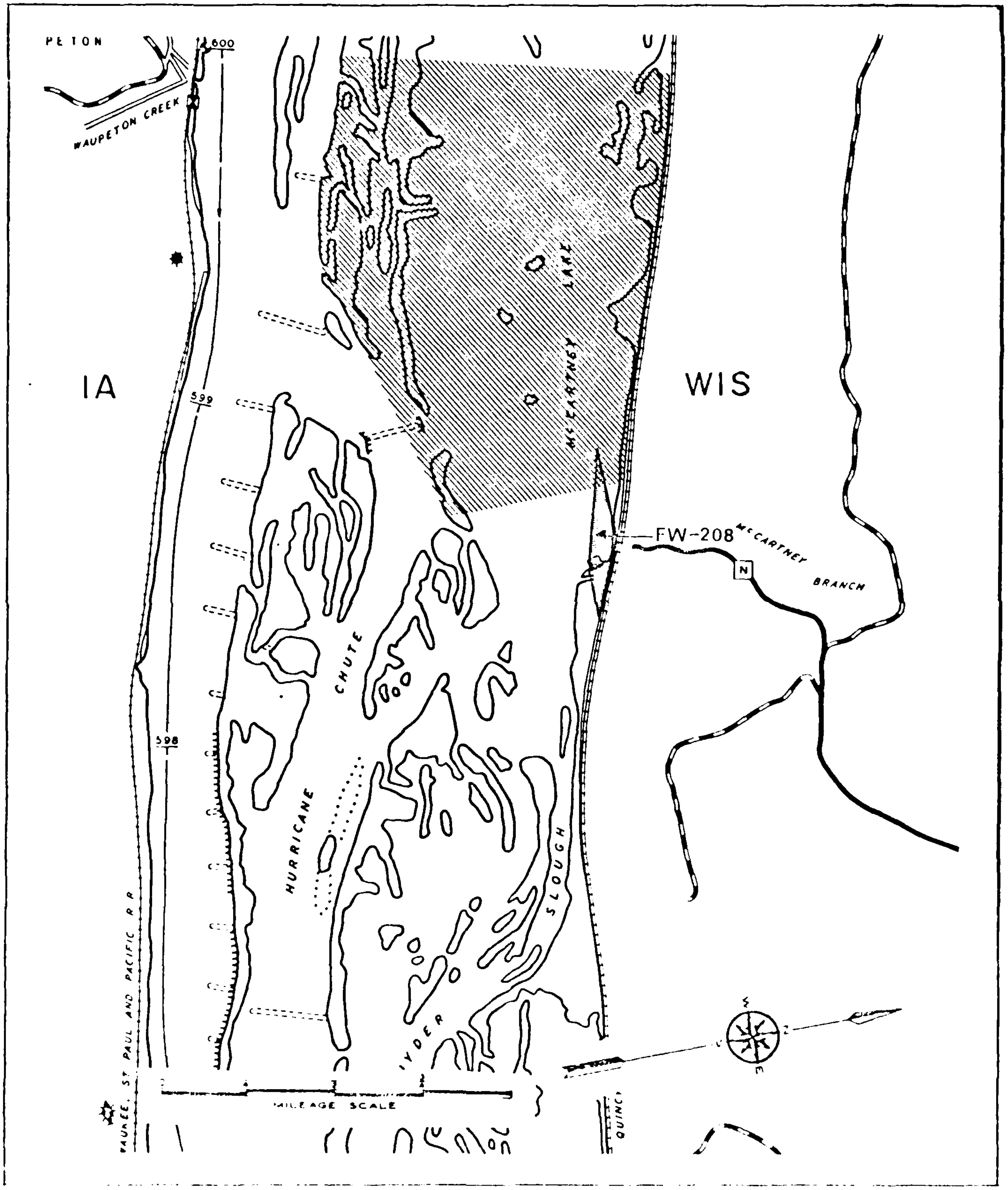


Figure 38: Special Use Area FW-208, McCartney Launch Area.

lowland floodplain at the east end of McCartney Lake. Elevation here is approximately 605' AMSL. The project area has been slightly altered due to construction of the Burlington Northern Railroad bed bordering FW-208 on the north and by the channelization of the McCartney Branch. Beyond the railroad tracks lie bluffs and an impressive valley occupied by the McCartney Branch. Project area vegetation consists of silver maple 4"-22" d.b.h., willow 15"-20" d.b.h., elm 8"-10" d.b.h. and ash 8"-15" d.b.h. with a sparse understory of grass and silver maple seedlings. FW-208 is located off State Route N south of State Route 133 in Waterloo Township in Grant County.

Archival Data:

McCartney (map code no. 47) was the site of a hamlet and railroad station. It is named after Oris McCartney, an early settler in the lead district. One prehistoric site (47 Gt 256) is located 350 meters up the valley north of tract no. FW-208. This is an unevaluated campsite. Flakes, shell, bone and a projectile point fragment were recovered by Geier (1975, 1976) "on a high point of a small river terrace in McCartney Valley near the mouth of the McCartney Branch." No other prehistoric sites are listed on the Mississippi lowland floodplain and associated terraces in the vicinity.

Field Investigations:

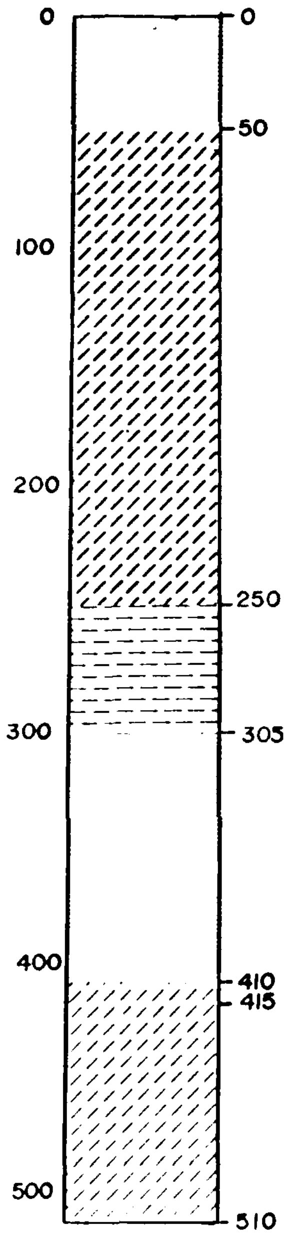
The McCartney launching area was visited on 5/15/84 and again on 6/18/84. No field tests were executed on these dates because a high river stage had inundated the project area. On 10/26/84 FW-208 was surveyed. A one inch silt probe was used to determine the depth of the presettlement surface. Test holes were probed in the project area lying south of the channelized stream. The only area above water north of the stream was dredge spoil. Since no foreshore was visible, the investigation was limited to coring. Results of coring indicate significant depths for presettlement alluvium, ranging from 2.5m at the south end to 4.10m at the north. Figure 39 presents a profile at this location. Two silt probe cores were taken and the profiles were described.

Geomorphic Setting and Interpretation:

This site is on a tributary floodplain overlying a low Mississippi terrace. Vertical accretion of silt with minor clay in the form of PSA has been aggrading this area. The location of the core is slightly downstream from the tributary channel and has experienced historical sedimentation.

PSA extends to at least 2.5m then a mixture of historical material and the presettlement surface horizon is encountered to a depth of 3.05m. The remainder of the profile reflects Holocene deposits of primarily vertical accretion silt and clay. Between 4.10 and 4.15m a darker

FW-208 McCARTNEY LAKE



0 Silt, 10YR 3/3, mottled, calcareous

50 Clayey silt, 5Y 4/1, gleyed, calcareous

250 Silty clay becoming darker (10YR 3/1) with organic enrichment in gleyed sediments. Calcareous at 250 cm. changing to non calcareous at 300 cm.

305 Silt, 5Y 4/1-5/1, non calcareous

410 Clayey silt, 10YR 3/1, organic enrichment, non calcareous

415 Clayey silt, 5Y 4/1, non calcareous

Figure 39: Profile, FW-208, McCartney Lake.

organic enriched horizon is seen in the profile. Judging by the relative degree of soil development this horizon is interpreted as a former surface of probably late Holocene age.

The entire profile represents episodes of both Holocene and historical aggradation of fine grained sediments. Generally, alluviation proceeded at a rate which precluded soil development, although the rate of accretion must have changed in order to develop two stable surface horizons. Hence, prehistoric occupation of these stable surfaces may have occurred.

Results/Recommendations:

Survey efforts were ineffective at the McCartney Launching Area because of the depth of pre-settlement surfaces. It does not seem likely that anticipated developments associated with the launching facilities will impact surfaces below the recent alluvial matrix. However, should deep excavations be conducted, construction should be monitored by a qualified archaeological technician.

6.14 TURKEY RIVER (UNNAMED AREA) FIA-102

Location and Landuse: (Figure 40)

Tract No. FIA-102 is located at the confluence of the Turkey River and the Mississippi River at river mile 607.8 on the Iowa side one mile west of Cassville, Wisconsin. Bounded on the north by the main channel of the Mississippi River, the project area occupies 15 acres of delta between two main channels of the Turkey River which border the area to the south, east and west. The average elevation is 605' AMSL. West of the delta a high narrow northwest-southeast trending bluffline north of the Turkey River lies between the Turkey River delta and an impressive valley occupied by the Turkey River. Turkey River Mounds State Monument runs along the top of this bluffline, so named because of the dense concentration of Indian mounds there. Vegetation at FIA-102 consists of cottonwood, willow, and silver maple with an understory of nettles and silver maple. The project area is accessible only by boat.

Archival Data:

No prehistoric sites have been recorded on the lowland floodplain or on associated terraces of the Mississippi River within or adjacent to the project area. However, several historic sites have been recorded in the vicinity (map code No.'s 22, 23, 24, 25, 26 and 27). Included in the order of the map code numbers just mentioned are: The Townsite of Frankford, in existence as early as 1839; the site of a cabin erected by Colonel W. Wayman, the first American settler in Clayton Co., Iowa; the Townsite of Turkey River Village; a battle site of the revolutionary war; the hamlet-railroad junction of Turkey River Junction; and the site of a Fox Indian Village, established in 1783.

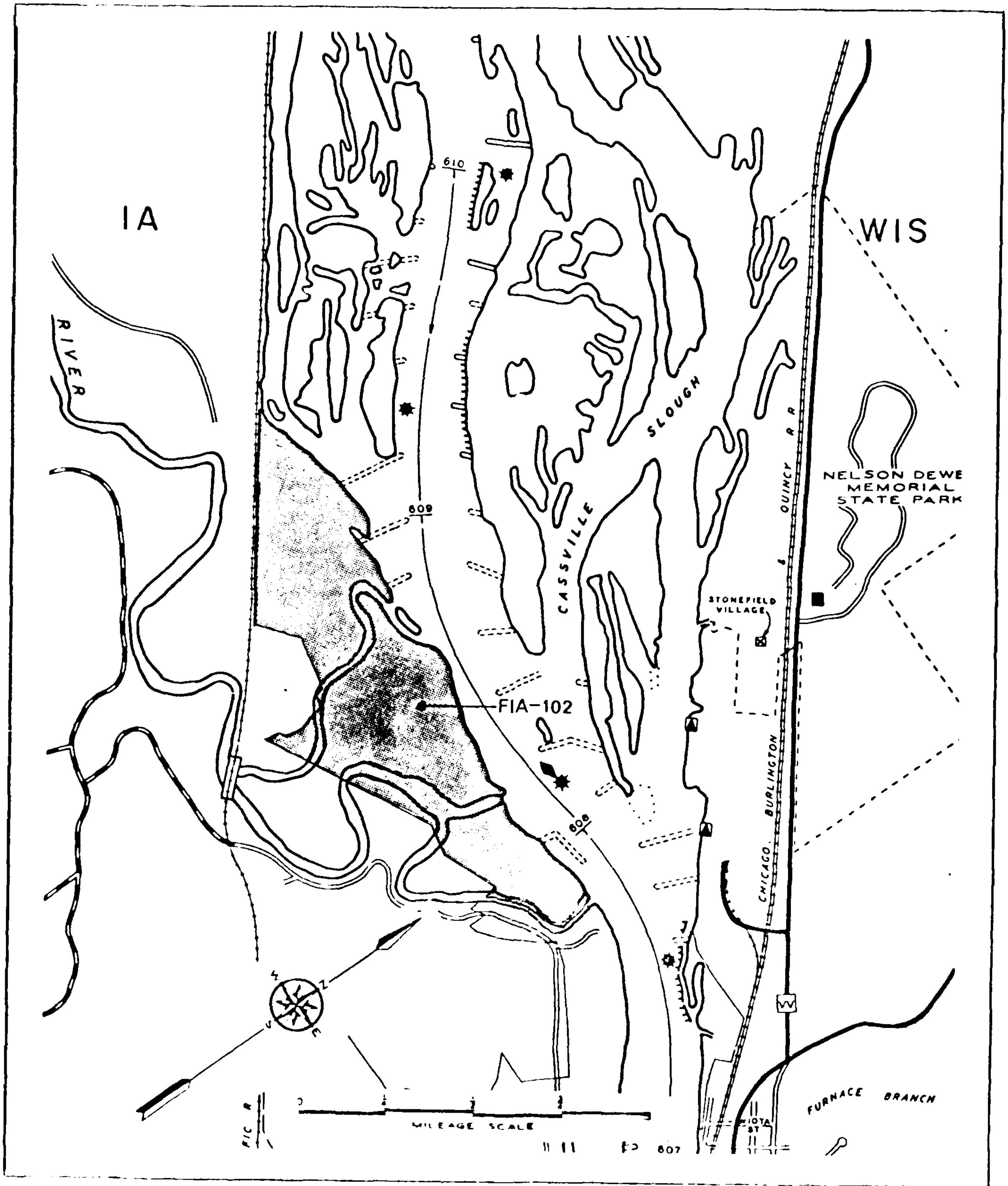


Figure 40: Special Use Area FIA-102, Turkey River.

Field Investigations:

On 8/29/84 a pedestrian survey of the cutbank and foreshore was carried out along 500m of shore adjacent to FIA-102 during the survey of the floodplain of pool 11. The results were negative due to the amount of PSA. From this assessment it was decided that coring should be carried out at FIA-102 to determine the depth of the buried presettlement surface. On 10/29/84 coring was conducted using a one inch silt probe. These investigations supplement remote sensing and RID-COE boring logs from this locality. Profiles (Figures 41 and 42) demonstrate the presence of at least 5m of PSA over a presettlement surface. The probe was unable to penetrate deeper than 5m and the depth of the presettlement surface is unknown.

Geomorphic Setting and Interpretation:

The area FIA 102 is situated on a deltaic alluvial landform at the confluence of the Turkey and Mississippi Rivers. The building of the delta has created a valley constriction and has caused the Mississippi river channel to divert eastward across the valley combining with Cassville slough to form one major channel.

From the profile description, historical alluvium is observed down to a depth of 4.9m below the surface. Individual flood episodes are characterized by sedimentological units of varying thickness with abrupt textural contacts. The sediments are derived from both the Turkey and Mississippi Rivers. Due to the deep burial of the area by PSA, the possibility for recovering cultural context near the surface is remote.

Results/Recommendations:

We have found no evidence of historic or prehistoric occupation on the Turkey River bottom at FIA-102, but it is likely that such data exist at unknown depths. In this instance the pre-settlement surface could not be identified with hand-tools. As a result, we would expect no potential impact from planned facilities. If excavations beyond 15' are anticipated, it would be worthwhile to monitor these excavations for additional information relating to sediment depths and chronology.

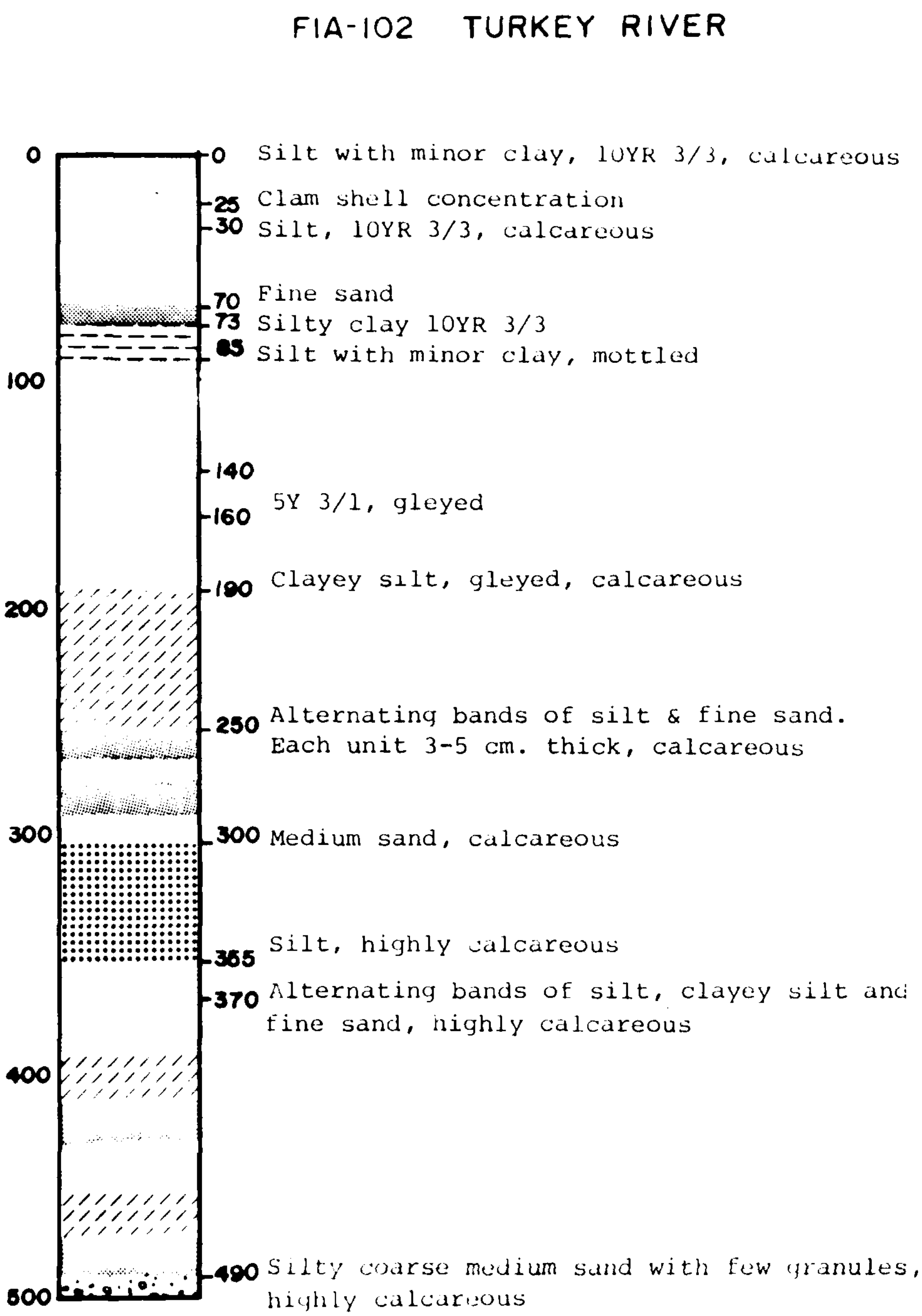


Figure 41: Profile, FIA-102, Turkey River.

FIA-102 TURKEY RIVER

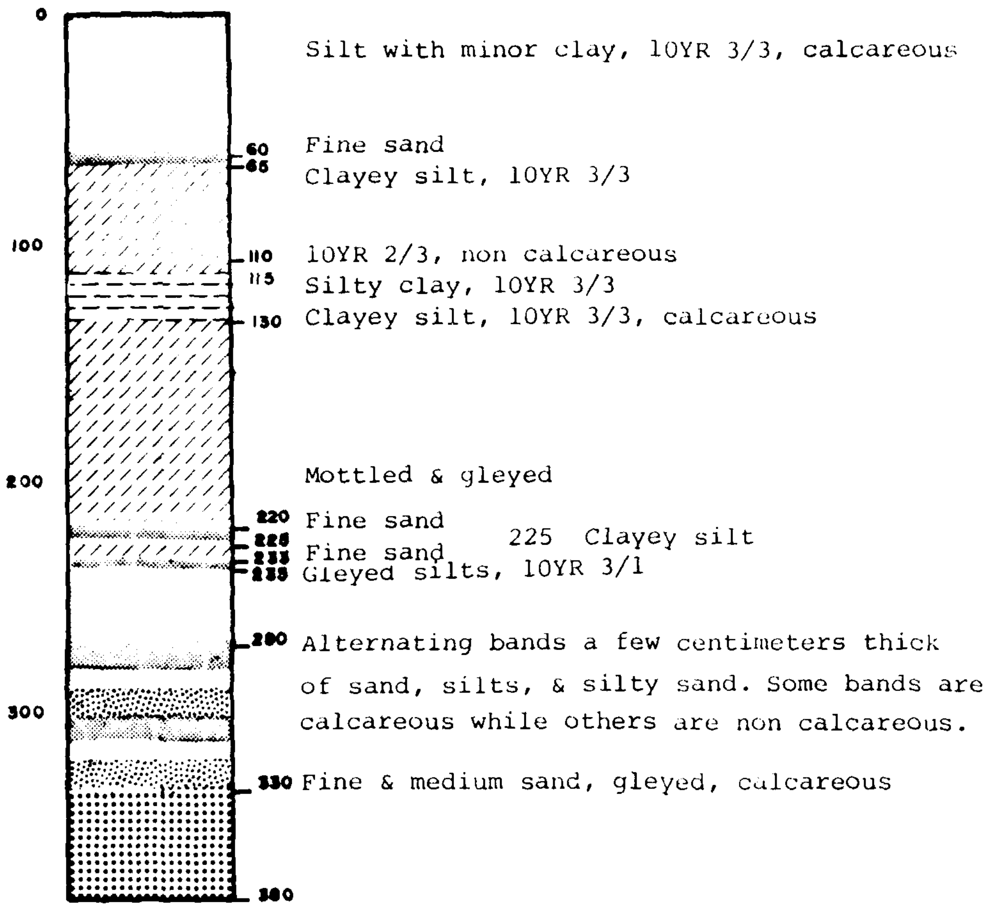


Figure 42: Profile, FIA-102, Turkey River.

TABLE 1: Summary-Special Use Area Investigations:

Name	Location	Results	Recommendations
Bertrom Lake Launch Area	RM 601.4, 4 acres, terrace, 605' AMSL	Avg. 2.2m of PSA, no sites	Monitoring
Lynn Hollow Launch Area	RM 596.1, 4 acres, floodplain, 605' AMSL	More than 2.8m PSA, no sites	Monitoring
Schleichers' Landing	RM 613.7, 4 acres, terrace and flood-plain 605-620' AMSL	4.0m PSA, no sites	Monitoring
Mud Lake	RM 589.4, 57 acres, terrace and flood-plain, 605-610' AMSL	2.0m PSA, no sites	Monitoring
Jamestown Rec. Area	RM 583.0, 10 acres, former island	3.7m recent deposits, no sites	Monitoring
Muddy Creek Public Use Area	RM 610.7, 36 acres, floodplain, 610' AMSL	4.7m PSA no sites	Monitoring
John D[illegible] Pla[illegible]	RM 585.7, 20 acres, terrace, 610' AMSL	disturbed terrace	No further investigations warranted
Guttenburg Public Use Area	RM 614.4, 28 acres, terrace and flood-plain, 605-625' AMSL	Historic & Prehistoric sites	Further testing
Anthony's Resort	RM 599.8, 3 acres, terrace, 605' AMSL	2.0m PSA, no sites	Monitoring
Furnace Branch	RM 607.3, 20 acres, terrace and flood-plain, 605-610' AMSL	Historic & Prehistoric sites	Further testing
Potosi Canal	RM 591.9, 10 acres, fan on terrace	distrubed & inundated	Monitoring
Wolfe Creek Rec. Area	RM 612.3, PSA over tributary fan, 605-610' AMSL	2.75m PSA, no sites	Monitoring
McCartney Launch Area	RM 598.4, 4 acres, tributary flood-plain, 605' AMSL	2.75 PSA, no sites	Monitoring
Turkey River	RM 607.8, 15 acres, delta, 605' AMSL	more than 5.0m PSA, no sites	Monitoring

7. ARCHAEOLOGICAL SURVEY:

Reconnaissance investigations resulted in the definition of previously unreported archaeological sites and confirmed, in some cases, sites that had been previously identified. Data were coordinated with the Office of the State Archaeologist in Iowa and the Museum Division of the State Historical Society of Wisconsin for assignment of site numbers. The following tabulation provides a summary for each site, an evaluation of the geomorphic context of the site, and, where possible, assignment to a particular cultural component(s). These archaeological sites cannot be evaluated without further investigation. In most instances significant amounts of alluvial overburden prohibit assessment of eligibility for the National Register of Historic Places. However, interpretation of geomorphic and stratigraphic contexts will serve as a useful guide to future decisions which may affect cultural resources identified during the archaeological survey. Additional site information may be found in the data file (Volume II of this report), and specific site locations can be found on maps appended to the data file.

7.1 47 GT 410

47 Gt 410 is located 780m southeast of the mouth of Dewey Creek on the northeast side of the main channel. The Cassville ferry landing is 700m to the south. An intermittent stream meets the main channel 40m northwest of the site and the Nelson Dewey Power Plant coal storage area lies just inland. Vegetation consists of silver maple and cordgrass along the shore. Elevation is 610' AMSL. The site is accessible to pedestrians, 420m from State Route VV.

In August 1984 a pedestrian survey along the cutbank and foreshore was conducted in the area after noticing a scatter of mussel shells from the survey boat. A historic scatter and shell midden was found extending 35m along the foreshore. Among the shell, square nails and a sherd of blue curved glass were found. A few limestone slabs were also present.

Table 2: 47 Gt 410 Inventory

1 flat water rolled pebble
4 rust encrusted square nails (1 clinched)
1 curved sherd of blue glass

47 Gt 410 is presently interpreted as a late 19th century shell midden related to the button industry. These unprocessed mussel shells probably represent a discard pile. The square nails indicate a possible 19th century structure at the site.

7.2 THE DEWEY CREEK SITE 47 GT 411

The Dewey Creek Site, 47 Gt 411, lies southeast of the confluence of Dewey Creek and a main channel of the Mississippi River within the limits of Nelson Dewey State Park. Island 192 is southwest across the channel. The Turkey River meets the Mississippi approximately 1.2km to the south. The site is situated along the shore on an eroding ridge on the lowland floodplain. Inland to the northeast, the lowland meets a terrace occupied by Stonefield Village. Vegetation at the site consists of silver maple. The understory is sparse, marked by ash, poison ivy and silver maple seedlings. Elevation is 610' AMSL. The site is 420m southwest of State Route VV.

The Dewey Creek Site was first located on August 14, 1984. On August 16 and on subsequent dates pedestrian surveys were conducted along the erosional cutbank and foreshore to determine the size of the site and to recover diagnostic material. The site conforms to a low eroding silt ridge from 150 to 225m southeast of the mouth of Dewey Creek. Chert flakes, blocks of chert, a Woodland ceramic sherd, burned limestone and several cobbles were evident along the foreshore. Weathered freshwater mussel shells were thinly scattered along the foreshore, probably prehistoric in origin. Chert flakes were also found in association with tree falls up to 30m inland. The only chert tool found was a curved chert flake unifacially retouched on its ventral lateral edges. One of the large cobbles had polished facets on its surface, another was used as a hammerstone. Intermixed with the prehistoric material was a thin scatter of historic artifacts including a barrel strap fragment, sherds of curved green glass, a sherd of white earthenware with a brown line around the outer edge, and a small silver "pendant" perforated at the top. Two silt probe cores were taken approximately 1m apart. The first core experienced refusal at 3.3m. Consequently a second core was taken which extended the profile to 3.7m. The profile was described, one sample and one photograph were taken.

Table 3: Dewey Creek 47 Gt 411 Inventory

<u>Prehistoric</u>

- 130 chert flakes (majority heat treated)
- 2 large blocks of chert
- 1 retouched chert flake
- 1 thin cord marked sherd (Late Woodland, Madison Ware)
- 1 large cobble with areas of polish
- 1 hammerstone
- 2 hammerstone spalls (?)
- 2 pieces burned limestone
- 3 freshwater mussel shells

<u>Historic</u>

- 1 triangular silver pendant

1 barrel strap fragment
1 unidentified metal fragment
2 shards of curved green glass
1 shard of white earthenware
1 piece of coal
1 piece of mortar (?)

A Late Woodland component can be determined at the Dewey Creek site by one thin, cordmarked body sherd. No projectile points were recovered, however, the Dietrich Dam Site, 47 Gt 412, located across the mouth of Dewey Creek, had either pot sherds or diagnostic point fragments from the Late Archaic, Middle Woodland and Late Woodland time periods.

The historic component is not identifiable. The silver "pendant" could be a component of an ear ring or other item of adornment. It probably dates to the early or mid-nineteenth century. A 19th century homestead is indicated by the tiny piece of mortar recovered and other domestic material including the barrel strap fragment, an earthenware sherd, piece of coal and the sherds of green glass.

Geomorphic Setting and Interpretation:

The site which is just downstream from the mouth of Dewey creek and is located on a tributary channel floodplain dissecting a low Mississippi terrace. The alluvial chronology of this site is dominated by historical sedimentation which is considerably different from what was observed slightly upstream at 47 Gt 412. The recent alluvial deposits originate from both Dewey Creek and Cassville Slough and are observed throughout the entire profile.

Thick PSA deposits are commonly found where tributary streams enter the main valley. This results from historical land use that has mobilized sediment in the upper reaches of the tributary watershed, and from the more recent pool impoundment which has raised the base level and lowered the stream gradient in the lower tributary reaches. Most of the alluvial units seen in the profile are calcareous and likely originate from the tributary watershed. Although one non-calcareous deposit seen at 1.5m may represent an alluvial unit derived from Cassville slough. Due to these thick historical deposits seen in the profile (Figure 43), it is doubtful that prehistoric context exists at this site within 3.7m of the present surface.

7.3 THE DIETRICH DAM SITE 47 GT 412

The Dietrich Dam Site, 47 Gt 412, lies northwest of the confluence of Dewey Creek and a main channel of the Mississippi River within the limits of Nelson Dewey State Park. Island 192 is southwest across the channel. The Turkey River meets the Mississippi approximately 1.2km to the south

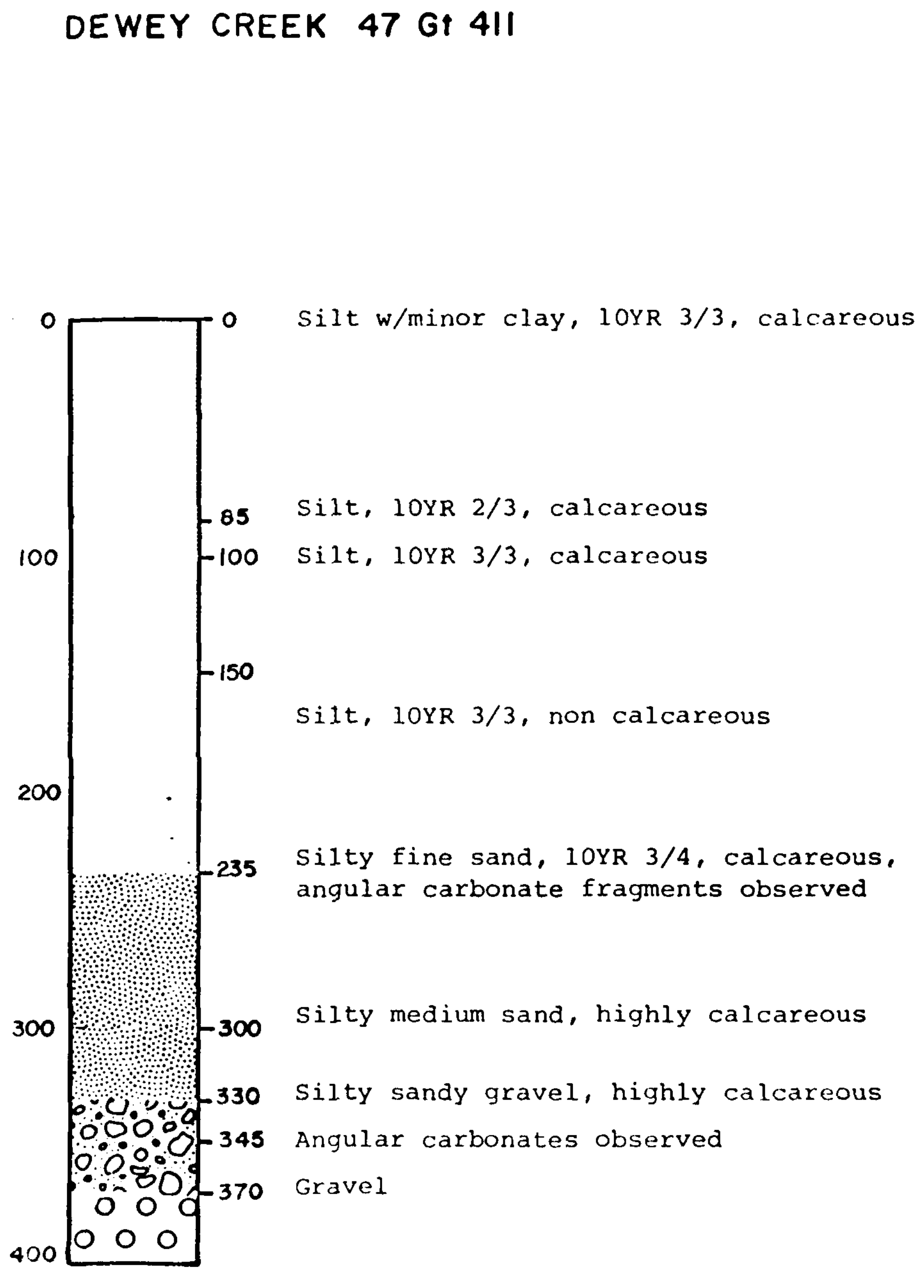


Figure 43: Profile, Dewey Creek, 47 Gt 411.

and the site is situated along the shore on the lowland floodplain. The Dewey Creek Site, 47 Gt 411, is located southeast of the mouth of Dewey Creek. Vegetation at the site consists of silver maple. Understory vegetation is limited to ash, poison ivy and silver maple seedlings. Elevation is 610' AMSL. The site is 460m southwest of State Route VV.

In August 1984 a pedestrian survey was conducted along the erosional cutbank and foreshore northwest of the mouth of Dewey Creek following the location of the Dewey Creek Site to the southeast of the creek mouth. Chert flakes, rolled cobbles, hammerstones, projectile point fragments, drills and bifaces were recovered along with a light scatter of historic artifacts. The site extends along the shore from 100-470m northwest of the creek mouth. The site is named from the remnant of an old dam 110m from the mouth of the creek. The dam was locally known as The Dietrich Dam ("Hatch" Ackerman, personnal communication). Subsequent visits to the site yielded more diagnostic point fragments. One core was taken through the combined use of the bucket auger and silt probe and the profile was described. A sandstone cobble was recovered at 70cm by the bucket auger.

Table 4: Dietrich Dam Site 47 Gt 412 Inventory

Prehistoric

- 235 chert flakes (many heat treated) and shatter
- 2 blocks of chert
- 9 chert bifaces (whole and fragmentary)
- 5 retouched flakes (chert)
- 7 chert projectile point fragments
- 1 side-notched chert projectile point reworked to a drill
- 4 sherds - 3 cordmarked, 1 exfoliated
- 5 hammerstones
- 2 water rolled cobbles
- 3 pieces of burned limestone

Historic

- 2 sherds of white earthenware
- 1 stoneware bottle base
- 1 Kaolin pipe bowl fragment (2 parallel incised lines)
- 3 sherds of light blue-green curved glass
- 1 horseshoe

This extensive campsite produced diagnostic artifacts from the Late Archaic, Middle Woodland, Late Woodland and historic periods. The Late Archaic period is represented by the base of a side notched point, lightly ground at the base, a blade portion with rounded shoulders which resembles a Durst point, and possibly by a side notched point reworked to a drill with light basal grinding. Two sherds from a thick walled Middle Woodland vessel were found. They are cordmarked on the exterior, are orange-brown in color and have a sandy paste. Blade flakes were also recovered. One

triangular point with the base snapped off and one thin cord-marked sherd are from the Late Woodland Period. Since all of the material was recovered out of context on the foreshore or at the base of the cutbank, placing the bifaces (blanks), utilized flakes and other point blade fragments in a specific time period is not possible.

The historic material was thinly scattered along the foreshore within 50m of the old dam remnant. The kaolin pipe bowl fragment, earthenware sherds, the horseshoe and the stoneware bottle fragment are all indications of 19th century utilization of the area.

Geomorphic Setting and Interpretation:

This site is located just upstream from the mouth of Dewey Creek on a low Mississippi terrace. The site is disturbed through historical land use as seen from the air photographs and the on site field observations. Large boulder sized blocks of dolomite are observed very near the site, and are thought to be in association with a road that was constructed across Cassville slough prior to pool impoundment. The historic Gov. Dewey farmstead and the recently reconstructed Stonefield Village are located within 200 meters of the site and may have affected the historical developments at this location.

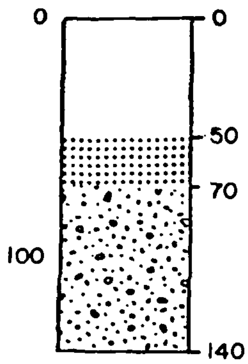
The surface is characterized by 50cm of PSA in the form of calcareous silt. Beneath this aggrading historical horizon a lighter colored sandy unit is observed. A dark presettlement surface horizon is not seen in the profile and has most likely been eroded. The sandstone cobble is seen in this unit and is considered to be a cultural rather than natural inclusion. From 70cm to 1.4m a coarse unit of medium sand with well rounded outwash pebbles and minor illuvial clay is encountered and interpreted to represent a considerably older unit.

The site may represent a part of the valley that escaped Holocene alluviation by fined grained sediment or may indicate erosion episodes which exposed the coarse outwash material closer to the surface. The events affecting the site during the Holocene are unclear, however, evidence suggests that erosion of the presettlement surface horizon probably occurred. As a result cultural material may be concentrated in the fine medium sand unit seen between 50cm and 70cm beneath the present surface (see Figure 44).

7.4 47 GT 413

47 Gt 413 is located on the northeast bank of a short narrow slough just off the northeastern main channel in the western most portion of Nelson Dewey State Park. State Route VV runs through the park and passes within 200m of the site. Vegetation is silver maple and river birch. Elevation is 605' AMSL. The site is accessible to pedestrians from State Route VV.

47 Gt 412



Silt, 10YR 2/3, calcareous

Fine medium sand 10YR 3/3, non calcareous, sandstone cobble at 70 cm.

Pebbly medium sand with minor clay, 10YR 3/3, non calcareous
Well rounded erratic outwash pebbles

Figure 44: Profile, Dewey Creek, 47 Gt 412.

In August 1984 evidence of a shell midden was discovered during a pedestrian survey of the foreshore and cutbank of the area. A profile was cut to determine the extent of the midden. A narrow lense approximately 1m long was exposed in the cutbank. However, further examination of crayfish (Decapoda) holes above the cutbank a few meters to the northwest showed more exfoliated pieces of clamshell and still more were seen under the roots of a rotting tree stump. A soil pit was excavated to a depth of 60cm with the bucket auger continuing to a depth of 2.0m. The silt probe finished the profile extending to a depth of 3.9m. The profile was described, four samples were taken and the site was photographed.

Table 5: 47 Gt 413 Inventory

6 hinge fragments from freshwater mussel shells

This shell midden extends at least 5m along the cutbank and a portion of it very likely lies intact in the low ridge. These shells are badly weathered which may indicate a prehistoric origin. No historic mussel shells encountered during the survey showed such extreme weathering. The depth of the midden (approximately 45cm) is not necessarily too shallow for a prehistoric horizon in this vicinity. The fragmentary mussels are not identifiable nor was enough material recovered for radiocarbon assay.

Geomorphic Setting and Interpretation:

The site is situated on the east side of the valley and located on a ridge of mixed lateral and vertical accretion deposits which overlies a low Mississippi terrace. Historical sedimentation is very slow with the weakly calcareous deposits being incorporated into the presettlement surface horizon.

The soil pit shows the mixing of the surface historical material with the underlying presettlement unit. According to the 1940 air photo the site appeared to be under agricultural use at that time, but it is now vegetated by mature cottonwoods and invading silver maples. Soil animals have nearly obliterated the former plowed horizon by mixing the overlying flood silt into the presettlement surface horizon. Organic material is being translocated down worm holes and root channels to a depth of 50cm which is close to the base of the presettlement surface horizon.

Unlike some of the other profiles seen and described, this profile has an eluvial horizon approximately 30cm thick and extends from 60cm to 90cm. Clay enrichment begins at about 90cm, continues to 2.0m, and is followed by a silt unit (Figure 45).

From 2.0m to the base of the profile at 3.9m, the possibility of two or more surface horizons may exist based upon sediment color. The darker silt seen at 2.0m, and the clayey silt seen at 2.7m may represent older surfaces,

47 Gt 413

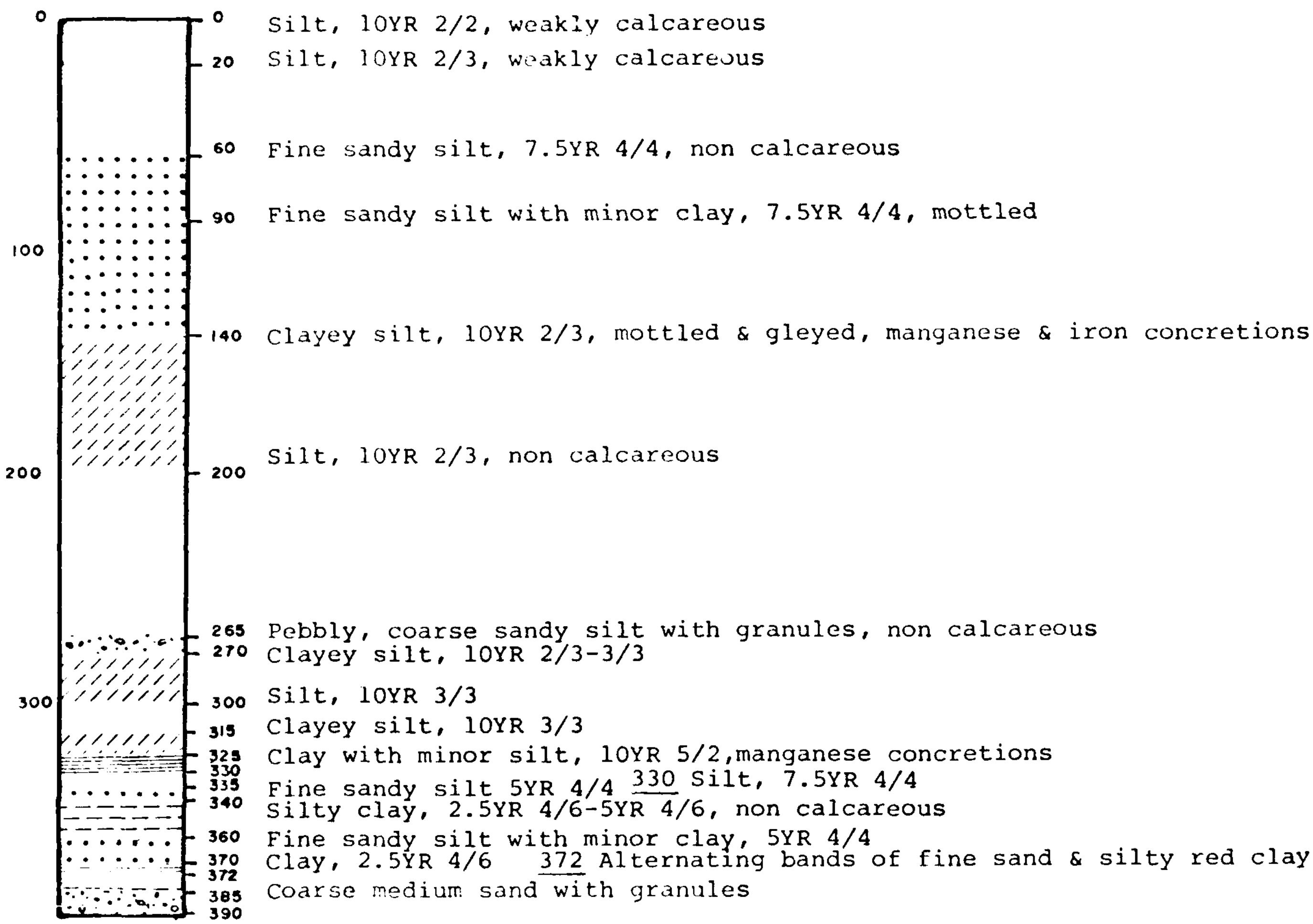


Figure 45: Profile, 47 Gt 413.

however, contamination from concretions found in the profile might have biased the color.

Below 2.65m textural discontinuities forming thin sedimentological units illustrate a complicated fluvial history. With the absence of stratigraphic correlation with other sites observed in the valley combined with an unknown lateral extent of the units, the age and genesis of these units can not be easily determined. However, some observations and interpretations can be made.

The 1893 topographic map shows that an upstream tributary joined Cassville Slough much farther south than its present channelized stream course. Evidence from the 1943 2' contour interval topographic map indicates that the stream course may have been in association with the swale immediately to the west and could have possibly influenced the fluvial history of the site. More likely, Cassville slough has had a greater influence on the alluvial history of the site.

The 1943 topographic map shows that the site is part of an arcuate ridge and swale system that has a northwest to southeast trend. About 0.5 miles upstream from the site in Cassville Slough, a contemporary ridge and swale morphology parallels the present stream course trending west to east. Downstream at the site, the present stream course is under the process of a northeastward lateral migration which is eroding the landforms associated with the site, while constructing a ridge and swale system on the opposite point bar side of the channel on Island 189. The interpretation is that the site encompasses a relict series of landforms which was created when Cassville Slough had a much different orientation in the valley and apparently was laterally migrating southwestward. Further evidence that suggests the antiquity of the landform is seen on the 1943 topographic map which shows a series of alluvial fans abutting the valley wall and encroaching upon this apparent older surface. Fans showing this kind of development are not observed up valley on the presumed younger surfaces.

The discovery of red (2.5YR 4/6) clay, brown and gray silty clay and clayey silt seen lower in the stratigraphic column is considerably different than the pedogenic clay observed closer to the surface. The red clay should not be confused with mottles which are associated with a fluctuating water table. These clays suggest a different origin. It is unclear whether they are in association with sources farther upstream in the Mississippi valley watershed, or whether they have a more local origin perhaps from the Driftless uplands in the form of residuum from weathered dolomite.

Coarse medium sand with granules appears at the base of the profile. Due to the coarseness of this unit penetration of only 5cm occurred. The unit may be associated with point bar deposition from Cassville slough which could be interpreted as a mid or late Holocene event. However, the

unit could be much older and represent an earlier Holocene event.

The profile observed at the site appears to represent a surface of considerable complexity and antiquity judging by the degree of presettlement surface soil development, the possible surfaces seen deeper in the profile, the alluvial clay seen deep in the profile, and the coarse basal unit. Consequently, a relatively high potential exists for the discovery of a multicomponent site with segregated cultural strata in this landform.

7.5 47 GT 414

47 Gt 414 is located on the north side of the main channel and on the south side of the southeast end of Jack Oak Island. New Buena Vista, Iowa lies across the main channel to the south. The inlet to Sand Cut is 300m northwest of the site. The vegetation consists of silver maple, ash, river birch, cottonwood and mulberry with an understory of poison ivy, grass and grapevine. Elevation is 605' AMSL. The site is accessible only by boat.

In August 1984 a pedestrian survey along the cutbank and foreshore revealed a small shell midden high on the foreshore. The midden is held in place under the root system of a large, recently fallen mulberry tree. A large iron fragment was found in association with the midden and is believed to be a stove top. The midden is 1.5 x 1.5m in diameter.

Table 6: 47 Gt 414 Inventory

7 freshwater mussel shells

The eroding ridge at the site and along the adjacent shore shows recently exposed secondary root systems on mature and maturing trees. This erosion of previous deposition has exposed the shell midden indicating a historic period origin. The probable stove top fragment suggests a structure though no mortar, nails or other structure-related material was recovered. This site may represent a late 19th century homestead with some button industry related activity areas.

7.6 47 GT 415

47 Gt 415 is located in a cornfield on a low sandy terrace south of Crooked Slough and north of Jack Oak Slough. The site is 100m inland from Jack Oak Slough and is adjacent to a backwater lake to the north. Elevation is 610' AMSL. The site is accessible by boat or field roads off State Highway 133.

In May of 1984 a single chert flake was found in a corn-field while doing remote sensing work there (GPR Run No. 1 Jack Oak Slough). Intense survey of the field yielded no

more prehistoric material although one spent rifle slug was collected.

Table 7: 47 Gt 415

1 chert flake, heat treated
1 spent rifle slug

The spent rifle slug is an artifact associated with historic hunting practices on the terrace, some of which continue today. The isolated chert flake from an undetermined prehistoric period suggests a buried archaeological site.

7.7 47 GT 416

47 Gt 416 is located at the confluence of the Furnace Branch and the Mississippi River northwest of Cassville, Wisconsin. The Furnace Branch bisects the terrace occupied by Cassville to the southwest and the Nelson Dewey Power Plant to the northwest. The site was located on dredge spoil along the southeast side of the channelized portion of the Furnace Branch on the lowland floodplain. Vegetation consists of silver maple with a sparse understory of cordgrass. Elevation is 610' AMSL. The site is accessible off State Route VV. A residential street ends at the site. 47 Gt 416 is within the Furnace Branch Public Use Area FW-262.

In May 1984 a pedestrian survey of the dredge spoil and associated erosional features revealed chert flakes and shatter and a piece of glass slag (?). A shell midden was also located 50m from the mouth of the stream but due to the channelization operation the depth of the midden is undetermined.

Table 8: 47 Gt 416 Inventory

5 chert shatter
4 chert flakes
2 broken chert bifaces
6 freshwater mussel shell hinge fragments
1 piece burned limestone
1 piece glass slag (?)

This is the site of a prehistoric campsite of undetermined age. Since the material was recovered on dredge spoil it can be assumed that the site is buried under post settlement alluvium. The shell midden may be prehistoric although no artifacts were found in direct association. The only artifact representing an historic component is a piece thought to be glass slag. A similar piece was found at 47 Gt 421 approximately 300m southeast of the Furnace Branch.

7.8 THE KLEINPELL PINES SITE 47 GT 417

The Kleinpell Pines Site 47 Gt 417 is located north of the confluence of the Furnace Branch and the main channel of

the Mississippi River. It extends along the terrace margin northwest of the channelized Furnace Branch which bisects the terrace immediately northwest of Cassville, Wisconsin. A grove of white and red pine grow on the terrace with an understory of woodnettle, mulberry, and various shrubs. The pines were said to have been planted by Julius Kleinpell in 1919 ("Hatch" Ackerman, personnal communication). Elevation is between 610 and 615' AMSL. The site is accessible off State Route VV.

In May 1984 the site was recorded during a pedestrian survey of the uninundated erosional cutbanks northwest of the channelized Furnace Branch as part of the Special Use Area Survey. The Kleinpell Pines site is located within the limits of the Furnace Branch Public Use Area FW-262. The site was revisited in search of diagnostic material, and one stemmed chert projectile point was recovered by a COE employee. Six excavation tests were placed along the terrace margin. Three of these tests yielded chert flakes and one diagnostic cord marked sherd. Historic material was noted but not collected including red clay bricks, large limestone blocks, crockery sherds, glass sherds and pieces of leather shoes (see Figures 32 and 33).

Table 9: Kleinpell Pines Site 47 Gt 417 Inventory

1 Kramer point, heat treated chert
2 plain woodland sherds
10 chert flakes
1 fire cracked (?) glacial cobble

Prehistoric occupation of the terrace margin during the Late Woodland and Early Woodland Periods is indicated by the Late Woodland sherd and the Kramer point. The bricks and associated refuse demonstrate a late 19th century homestead.

7.9 47 GT 418

47 Gt 418 is located four miles northwest of Cassville, Wisconsin off Closing Dam Road east of Schleicher's Commercial Recreation Area FW-274. The site of an isolated find lies 100m up a small steep valley occupied by an intermittent stream east and across Closing Dam Road from the Mark Schleicher residence. Elevation is approximately 670' AMSL.

In May 1984 an oral interview with Mark Schleicher revealed an isolated find with good provenience. A complete chert side notched point had been recovered from the edge of a streambed. The point and the site were photographed. It is not known whether the point had been redeposited. No other artifacts were recovered.

Table 10: 47 Gt 418 Inventory

1 chert side notched point (Raddatz-Osceola, Late Archaic)

7.10 47 GT 419

47 Gt 419 is located on the east side of the confluence of Mill Branch and Jack Oak Slough. It occupies a low terrace below the Cassville terrace and airstrip. Jack Oak Island is to the south. Vegetation consists of mature river birch, walnut, honey locust and and a few silver maples with an understory of poison ivy, grape vine, and Virginia creeper. Elevation is 610' AMSL. The site is accessible off State Route 133.

In August 1984 a pedestrian survey along the foreshore and cutbank on the north shoreline of Jack Oak Slough was conducted. Chert shatter and flakes were found along 60m of foreshore ending at the southeast side of the mouth of Mill Branch where one piece of calcined bone was found. One silt probe core was taken and the profile was described. One sample was taken from the core.

Table 11: 47 Gt 419 Inventory

4 chert flakes
3 chert shatter
1 flat large chunk of chert
1 possible hammerstone (igneous cobble)
1 piece calcined bone

This is the site of a prehistoric camp of undetermined age. No diagnostics were recovered.

Geomorphic Setting and Interpretation:

Site 47 Gt 419 is located on a low Mississippi terrace abutting an older higher terrace surface. The site is on the east bank of Jack Oak Slough across the channel from Jack Oak Island. The profile consists of mixed lateral and vertical accretion deposits with a thin veneer of PSA on the surface.

Vertical accumulation from historical silt is slow and confined to about the top 10cm. Due to this slow surface aggradation, the presettlement surface horizon is being mixed with the overlying unit. What appears to be an eluvial (E or A-2) horizon occurs from 40cm to 1.0m, with the subjacent units composed mostly of sand and illuvial clay.

The unit seen between 2.4m and 3.6m which shows the clay bands becoming closer together and then rapidly disappearing may represent a buried argillic horizon; however, no overlying buried former surface horizon was observed. These lower clay bands found in the profile may represent alluvial episodes and not pedogenic horizons. The genesis of the clay bands cannot be determined due to incomplete data.

At 4.5m a very weak indication of organic enrichment was seen just above the sand with granules. Whether this organic enrichment represents a former surface cannot be determined because data obtained from coring is insufficent.

This is especially true when complicated alluvial and pedologic units are in question.

This site profile (Figure 46) represents units of presumably older age than the profiles observed across the slough at Jack Oak Island. This is based upon the relative degree of soil development and on the presence of outwash sediments seen at the base of the profile. The possibility for recovering intact cultural deposits may be good, especially close to the surface. Although no obvious stable deeply buried surfaces were observed, a possible early surface is noted at 4.5m. Deep excavations are necessary in order to determine if deeply buried surfaces associated with cultural horizons can be identified.

7.11 47 GT 420

47 Gt 20 is located on the north side of the northeastern main channel at the southeast end of a low ridge. The lower end of Island 189 lies across the main channel to the south. Vegetation is silver maple with no understory and elevation is between 605 and 610' AMSL. The site is accessible to pedestrians and is 400m southwest of State Route VV.

In August 1984 during a pedestrian survey of the cutbank and foreshore in the area, a historic midden was found not on the cutbank but on the crest of a long narrow northwest-southwest trending ridge. The midden is approximately 2.0m in diameter. Diagnostic material was collected including an orange crush soda bottle base and sherds from the base of a large glass water jug or large preserve jar with a date of "1923" on the base. A metal cigarette case, missing the top, was also collected. Many pieces of clear flat glass were noted but not recovered.

Table 12: 47 Gt 420 Inventory

1 metal cigarette case (top missing)
1 base to a soda bottle (Orange Crush Bottling Co. Madison, Wisconsin) circle within square design
2 large sherds from the base of a large water jug or mason jar, blue-green glass with the number "88" on one side, the numbers "1923" on the other side is assumed to be a date.
1 clear glass sherd, curved, letters "H.C." fragmentary logo

This site is likely related to early 20th century domestic activities.

7.12 47 GT 421

47 Gt 421 is located between the confluence of the Furnace Branch and the northwest corporate limits of Cassville, Wisconsin. The site runs northwest-southeast

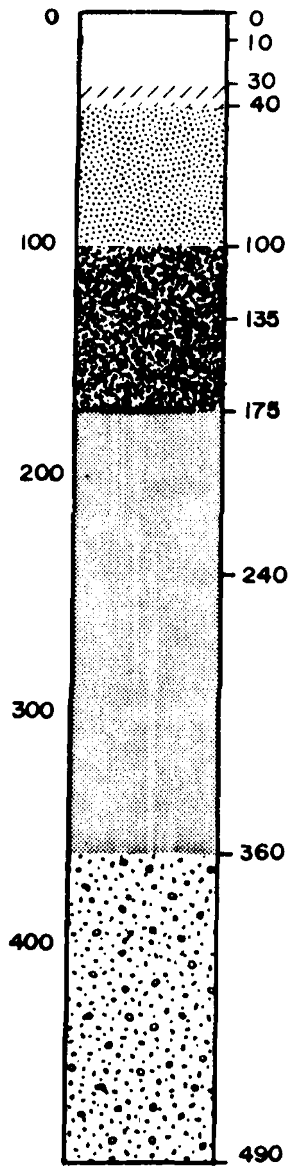


Figure 46: Jack Oak Slough, 47 Gt 419.

along the foreshore between the Cassville terrace and the main channel of the Mississippi River from 300 to 380m southeast of the mouth of the Furnace Branch. The terrace is developed with maintained lawns and private homes. Elevation is 610' AMSL. The site is accessible from State Route 133. A residential street runs parallel to the site and 47 Gt 421 is within the limits of the Furnace Branch Public Use Area FW-262 (see Figure 32 and 33).

In October 1984 a pedestrian survey was conducted along the southern reach of Tract No. 262. A thin historic scatter was present along 80m of sandy foreshore. A small historic mussel shell midden was eroding from the cutbank. During the surface collection a stemmed projectile point made of chert was found. The tip of the blade had been reworked to a drill. No other prehistoric material was found.

Table 13: 47 Gt 421 Inventory

1 chert stemmed projectile point reworked to a drill
4 freshwater mussel shells
2 brick fragments, water rolled
1 curved glass shard
2 unidentified metal fragments
1 nail, rust encrusted
2 brown glazed earthenware sherds
1 coal clinkers
1 piece of glass slag (?)

A prehistoric component is represented by the single chert tool. The stem of this reworked projectile point resembles that of a Kramer point from the Early Woodland Period. The brick fragments, nail, and earthenware sherds suggest the site of a 19th century structure in direct or indirect association with a probable button industry related shell midden.

7.13 47 GT 422

47 Gt 422 is located on a high eroding bank on the east side of the east main channel near the Wisconsin-Iowa border, 500m north of the "narrows" of Island 189. The mouth of Muddy Creek lies 600m to the north. Vegetation at the site is silver maple, ash, and cottonwood with a few young elms. Elevation is 610' AMSL. The site is accessible either by boat or on foot. For pedestrian access the site is located 1km southwest of State Route VV.

In August 1984 remnants of a limestone slab foundation to a residence or seasonal cottage were found above the cutbank. Mortar was still present in the immediate vicinity of the limestone slabs. Sherds from a single china plate were recovered at the top of the cutbank. The outer edge of the plate has an orange, blue and green floral design on a white background. In the center of the bottom side of the

plate a maker's mark reads "The -- Owin M. Knowles Ivory 29-2-8.

Table 14: 47 Gt 422 Inventory

3 pieces of mortar
7 shards from a single china plate

The steep cutbank is quickly eroding. Slumping of the cutbank is evident at the site and no doubt more diagnostic artifacts have been swept away. The foundation slabs rest on the surface with only a minimal amount of siltation present. An abandoned cottage is located nearby and 47 Gt 422 is very likely the remnants of another cottage from the early 20th century.

7.14 ACKERMAN CUT 13 Ct 210

The Ackerman Cut Site, 13 Ct 210, is located on the south shore of Ackerman Cut 120m from its mouth. This "cut" flows through Island 189 in a northeasterly direction; water is diverted into the channel from the main navigation channel to the west and empties into the eastern main channel to the east. Vegetation consists of young silver maple, mature river birch and young elm with an understory of elm, ash, woodnettle, grape vine, poison ivy and sparse patches of unidentified grass. Elevation is 605' AMSL and the site is accessible only by boat.

Site 13 Ct 210 was located during a pedestrian survey of the Ackerman Cut locality in August 1984. The south bank of Ackerman Cut is subject to intense erosion. The silty cutbank is steep to slightly sloping with little or no foreshore. Below the cutbank the fast flowing water has in some cases undercut the bank, otherwise the channel drops vertically to a depth of more than 5'. The purpose of this description of the bank is to demonstrate the probability that prehistoric material eroded from the cutbank has a very short lifespan on the surface. Due to the lack of foreshore, the steep bank is exposed to waves from boat traffic, and any material eroded from the cutbank is quickly washed into the channel. On disembarking from the boat a crude broken chert biface was recovered teetering on the edge of the narrow foreshore. A few meters away a single cordmarked bodysherd was found on a slumped portion of the cutbank. By locating the spot from which the piece had slumped several more sherds from the body, shoulder, neck and rim of a single Late Woodland vessel were recovered. First a trowel was used to cut a profile in the cutbank, then a small 50 by 30cm unit was dug to recover the remaining _in situ_ sherds. The intent was to record their depth and recover them before they were lost to erosion. The sherds were lying flat and some were lying over each other indicating that a portion of a vessel had collapsed on itself. This was at a depth of 1.40m below the surface. A complete description of the soil profile is

provided. Fourteen meters downstream and at the same stratigraphic horizon a concentration of charcoal was seen in the cutbank. After completion of a 1 by .5m test pit no cultural material was recovered. This feature is interpreted as a hearth. Charcoal was concentrated along approximately 40cm of the profile and was no deeper than 4cm. A soil pit was excavated to a depth of 2.0m, and the silt probe continued from 2.0m to the base of the profile. The entire profile was sampled, described and photographed.

Table 15: Ackerman Cut 13 Ct 210 Inventory

1 crude chert biface fragment
11 rimsherds cord impressed
16 cordmarked body sherds

All recovered pot sherds are from a single vessel of the Late Woodland period. The chert biface fragment is very likely from the same time period based on the assumption that it could not have been washed ashore from a deeper horizon due to the steep nature of the bank of Ackerman Cut.

Geomorphic Setting and Interpretation:

Ackerman Cut is located on a mid-island ridge which is truncated by a minor channel connecting the two major river channels. The ridge is composed of mixed lateral and vertical accretion deposits and is mantled by a thin veneer of PSA. The surface 33cm is composed of weakly calcareous, silty historical alluvium while the subjacent presettlement surface horizon extends to about 50cm and is characterized by good structural development with organic matter enrichment (Figure 47).

Below 50cm at least two weakly developed surface horizons are seen in the profile. A weakly developed A horizon is observed from 57cm to 64cm and another between 135cm and 142cm where a portion of a Late Woodland vessel was recovered. Below 142cm abrupt textural discontinuities proceed from medium sand to silty fine sand and eventually to silty clay. The deposition of medium sand in well defined units suggests that episodes of increased fluvial activity interrupted the long term aggradation of silty clay observed below.

Due to the site specific nature of only one profile exposure, conclusive interpretation of the alluvial chronology remains unclear. However, evidence from the air photos indicate that in 1940 Ackerman Cut was highly vegetated and appeared to have little if any sustained flow, and probably behaved as an overflow channel. As the pool level rose, by 1961 a sustained flow was being maintained which may have been artificially induced. Throughout the Holocene, this minor channel may have inherited a dual role. During times of sustained flow and direct access to both major channels active lateral migration of the channel and point bar development may have been responsible for the coarser alluvial deposits. But when the channel outlet was

ACKERMAN'S CUT

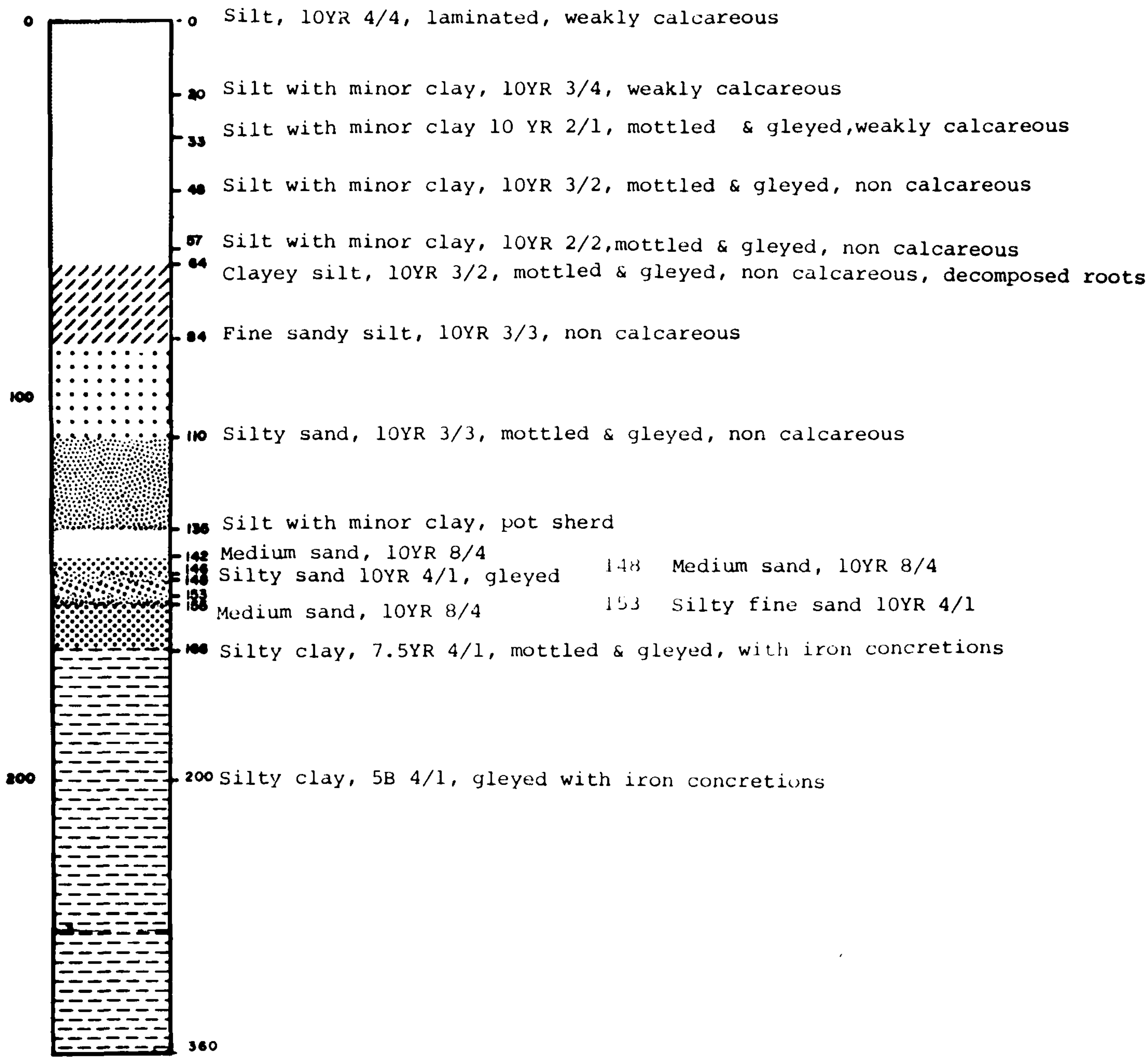


Figure 47: Ackerman Cut, 13 Ct 210.

periodically cut-off by bedload deposits migrating down the main channels, Ackerman Cut acted as an overflow channel and aggradation of finer grained sediments presumably occurred.

The Ackerman Cut profile represents alluvial events that have occurred during the Holocene. Evidence of older Late Woodfordian gravels were not seen in the profile and are assumed to be located deeper in the stratigraphic column. The prospects for locating prehistoric cultural horizons remain good in the vicinity of Ackerman cut since the profile evaluation uncovered more than one prehistoric surface. In addition, earlier sites more deeply buried may be present but would be logistically difficult to sample.

7.15 13 CT 211

13 Ct 211 is located east of the "narrows" of Island 189 on the south bank of Cassville Slough, the northeastern main channel. Silver maple is dominant at the site with large dead elms still standing and an understory of wood-nettle, cordgrass and poison ivy. Elevation is 610' AMSL. The site is accessible only by boat.

In August 1984 a survey along the cutbank and foreshore of the north side of Island 189 was conducted. An historic scatter was evident along 40m of the foreshore and eroding out of the cutbank. Within this scatter was a small shell midden scattered over 2m. Sherds of white ironstoneware were recovered as well as short sections of rusted barbed wire and staples, a cut soupbone and a lead net weight. One short section of barbed wire was pulled from the silty cutbank at an approximate depth of 30cm.

Table 16: 13 Ct 211 Inventory

3	sherds of white ironstoneware
1	burned crockery sherd
1	railroad spike
9	pieces of barbed wire
3	fence staples
2	stove part fragments (?)
1	cut "soupbone"
1	cylindrical lead net weight
2	unidentified metal fragments

The recovered artifacts indicate a late 19th century farmstead. The barbed wire being used to contain farm animals and the ceramics and soupbone representing domestic activities. Fishing is implied by the lead net weight and the railroad spike. Railroad spikes are sometimes used as sinkers on trot lines. The small shell midden is probably related to the button industry and could represent an activity to provide extra income for the farmstead.

7.16 13 CT 212

Site 13 Ct 212 is located on the southwest shore of Island 189 on the northeast side of the main navigation channel. A long narrow island remnant is located just off shore. The island has eroded away leaving a long line of riprap which is mostly submerged. Some of the riprap extends to the present shoreline. The site is located just shoreward of this eroded riprap area. Vegetation consists of mature silver maple with an understory of poison ivy, grape vine, patches of grass and elm. Elevation is between 605 and 610' AMSL. The site is accessible only by boat.

In August 1984 a pedestrian survey along the cutbank and foreshore revealed a 5m thin scatter of freshwater mussel shells along .5 miles of the foreshore. The shells were skinless and appeared to be purposefully concentrated. No other surface collection was made. The thin scatter of shell was left for future relocation during a low river stage.

The shell midden is probably a late 19th century or early 20th century discard pile associated with the button industry. According to local informants, it was the practice of buyers to sort clams and discard those unsuitable for button manufacture.

7.17 FIDDLER'S POINT 13 CT 213

The Fiddler's Point Site, 13 Ct 213, is located on the east shore of the main navigation channel across from Guttenberg, Iowa at the north end of Island 189. The site extends from approximately 300 to 450m south of Lock and Dam No. 10 along the cutbank and foreshore. Vegetation consists of silver maple, river birch, and young elm with an understory of poison ivy and silver maple saplings. Elevation is 605' AMSL. The site can be reached on foot from the lock and dam.

On August 27, 1984 the area was surveyed. The site consists of a shell button blank midden extending 75m along the foreshore and cutbank. Other historic artifacts and unprocessed freshwater mussel shells are located within the limits of the midden. Historic material exclusive of shell extends north and south of the midden.

Table 17: 13 Ct 213 Inventory

1	sherd glazed earthenware
1	water rolled brick fragment
1	horseshoe
2	metal bastard cut files
1	scythe blade
1	iron rod
1	rectangular clear glass pharmacy bottle
20	shell button blanks

Although the shell button blank midden indicates a

button industry related component, no house or other structual foundations remain. The other material was not concentrated but thinly scattered along the foreshore. The midden and historic scatter is probably of late 19th century origin.

7.18 13 CT 214

Site 13 Ct 214 is located on the southwest side of Island 189 below the "narrows" on the northeast shoreline of the main navigation channel. The landscape has been altered in the site vicinity from channel maintenance. Piles of sand containing small gravels are present at the site and southward from dredging operations. These open sandy areas are used as campsites by boaters. Specifically the site is located on a silty patch of foreshore below a spoil pile. Vegetation on the perimeter of the sand pile is switchgrass. Out of the sand the vegetation consists of honey locust, willow, silver maple, elm, and large cottonwoods with an understory of woodnettle. Elevation is 605' AMSL. The site is accessible by boat.

In September 1984 a pedestrian survey along the cut bank and foreshore revealed a single chert flake on a silty patch along an otherwise sandy foreshore. The flake has a brown patina. The ventral surface has a pronounced bulb of percussion and the dorsal surface has several flake scars. A careful search along the adjacent foreshore and on the silty patch yielded no more cultural material.

Table 18: 13 Ct 214 Inventory

1 chert flake

This undiagnostic single chert flake cannot be tied to any specific prehistoric cultural period. It can only be said that it is of prehistoric cultural origin. Furthermore, it could be redeposited from a lower horizon.

7.19 13 CT 215

Site 13 Ct 215 is located on the southwest side of Island 189 below the "narrows" on the northeast shoreline of the main navigation channel. An old wingdam is located 100m upstream. Elevation is 605' AMSL. Vegetation consists of young silver maple and willow. The site is accessible by boat.

In September 1984 a pedestrian survey along the cutbank and foreshore yielded one heat treated chert flake and a spiral fractured long bone fragment 200 meters northwest of 13 Ct 214 where a single chert flake was found. Further search produced no more prehistoric material. An historic scatter occurs along a 20m reach of the foreshore coincident with the chert flake and bone fragment location. Pieces of coal, coal clinkers, and a small piece of mortar were found. One Oakfield core was taken and the profile was described. Two samples were taken and the site was photographed.

Table 19: 13 Ct 215 Inventory

7 coal clinkers
1 piece of coal
1 piece of mortar
1 spiral fractured longbone fragment
1 heat treated chert flake

The piece of mortar indicates a structure but either the structure is completely eroded away or is buried in the silts. The coal, coal clinkers, and mortar could have been transported downstream from another location. This is also possible for the chert flake and bone fragment. Until it can be determined whether or not the material was transported, prehistoric and historic time periods cannot be ascertained.

Geomorphic Setting and Interpretation:

This site is located on a ridge along the west end of Island 189 approximately one mile south of site Ct-217. According to the profile description, the ridge is composed primarily of mixed lateral and vertical accretion deposits. From the core taken it is difficult to ascertain the depth of PSA which caps the surface, because no presettlement surface horizon was observed.

The surface 30cm shows a structureless medium sand component which is a recent historical deposit (see Figure 48). A weakly calcareous silt unit is encountered down to 150cm. An increase in clay is observed beginning at 150cm and extending down to 350cm. Whether the increase in clay is attributed to illuviation or alluviation or perhaps both processes is unclear because structural attributes of the unit were not recovered with the silt probe. In addition, no apparent presettlement surface horizon was observed overlying the clay enriched horizon. Below 350cm aggradation of gleyed sand, sandy silt, and silty sand shows no evidence of surface development.

Examination of the profile suggests that PSA involves at least the surface 30cm and possibly extends to a depth of 150cm. The reason behind the absence of a presettlement surface horizon is unclear. Perhaps aggradation at this site has been rapid enough to prohibit the development of an organic rich surface horizon or possibly the former surface has been sufficiently eroded therefore eluding field recognition. Finally, the entire profile may represent historical sedimentation.

The last possibility seems quite remote since the air photographs depict little change in the morphology of the site and the field observations lack the evidence for rapid site burial. Erosion of the presettlement surface horizon seems to be the most likely explanation for the apparent unconformity, since the site is adjacent to the main river channel perhaps the velocity is sufficient during the rising flood stage to promote surface erosion. However, in order to more accurately evaluate the alluvial chronology and

13 Ct 215

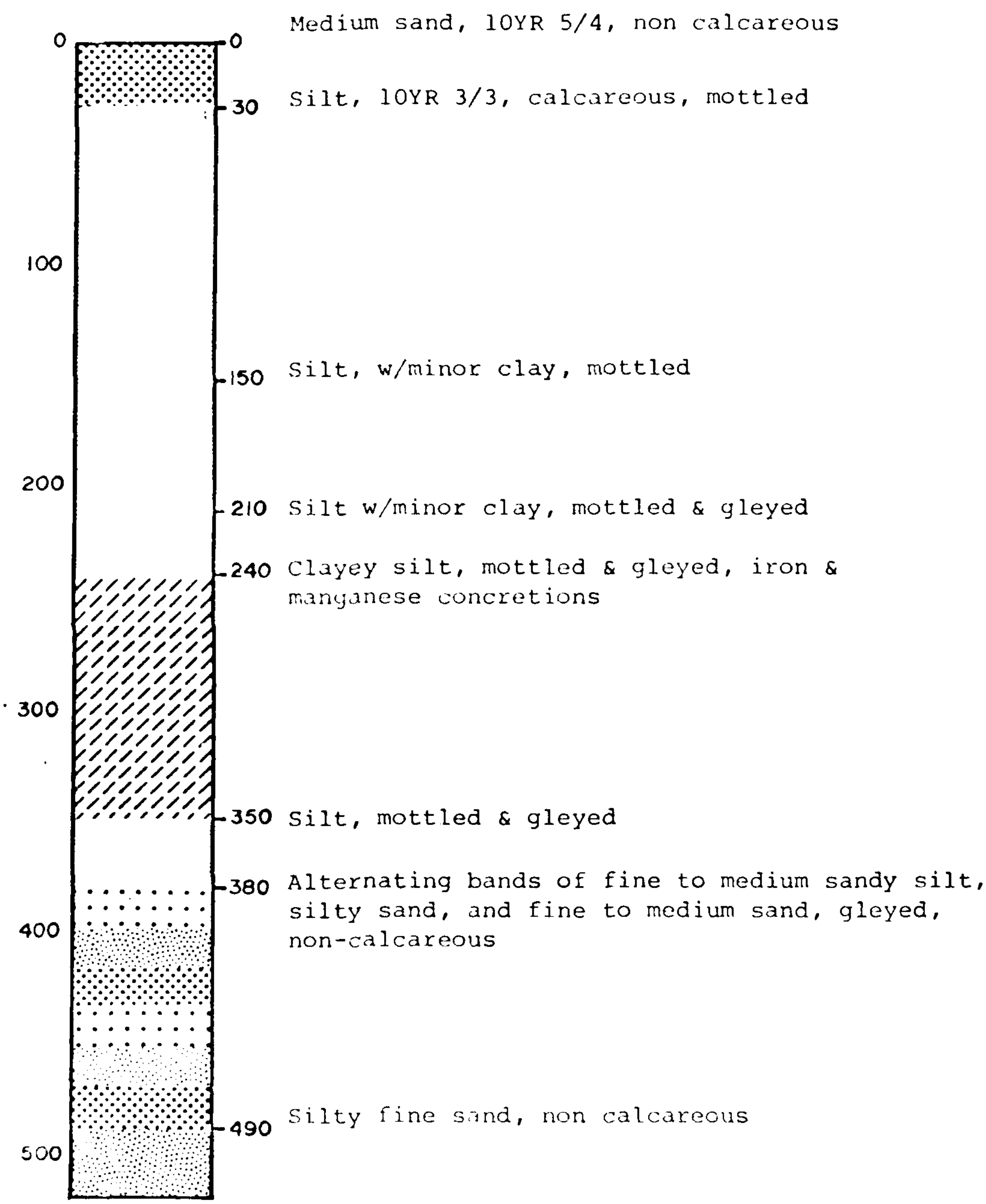


Figure 48: Profile, 13 Ct 215.

assess the potential for cultural context at this site additional fieldwork would be required.

7.20 13 CT 216

Site 13 Ct 216 is located on the northeast side of the main navigation channel on the southeast end of a tiny island south of the "narrows" of Island 189. Vegetation consists of immature silver maple and elm with an understory of elm, grape vine, nutsedge and grass. Elevation is 605' AMSL. The site is accessible only by boat.

In September 1984 a pedestrian survey was conducted along the cutbank and foreshore of the island. The island is quickly eroding where it faces the main channel. The remaining trees are being undermined and soon the island will be a sand bar. A thin historic scatter is present at the southeast end of the island.

Table 20: 13 Ct 216 Inventory

3 rust encrusted pieces of metal (less than 1cm)
1 flat circular rust and sand encrusted object (resembles a mason jar lid)
1 unidentified charred piece (slag?)
1 freshwater mussel shell (skinless)
(A few coal clinkers were seen but not collected)

No diagnostic material is present in this historic scatter. A late 19th century - early 20th century date is proposed.

7.21 13 CT 217

Site 13 Ct 217 is located on the southwest shore of Island 189 on the northeast side of the main navigation channel. A long narrow island immediately south of 13 Ct 217 has completely eroded away. The only remnant is a line of riprap visible during low river stage. 13 Ct 217 may be completely eroded away. Elevation is between 605 and 610' AMSL. The site is accessible only by boat.

On August 21, 1984 a short length of rust encrusted barbed wire and the labeled portion of a medium sized crock were recovered from the water during a pedestrian survey of the foreshore and cutbank. A shell midden, 13 Ct 212, is located approximately 200m southeast of this site. It too is in a very eroded condition. A soil pit was excavated to a depth of 50cm with the remainder of the profile cored by the silt probe. The profile was described and two samples were taken.

Table 21: 13 Ct 217 Inventory

3 labeled sherds to a creamy glazed medium sized crock - Western Stoneware Co. Plant
1 short section of rust encrusted barbed wire

A late 19th century farmstead can be assigned to 13 Ct 217. The short section of barbed wire indicates an enclosure to confine farm animals or keep them out of a field or garden. The Western Stoneware Co. Plant within a maple leaf is centrally located on the wall of the crock. Above the maple leaf below the rim of the crock is another portion of a design. It is fragmentary and cannot be deciphered.

Geomorphic Setting and Interpretation:

The site is located on a ridge along the west end of Island 189. From the profile description (Figure 49), the island ridge appears to be composed primarily of lateral accretion deposits with a thin veneer of PSA vertical accretion deposits. Judging from the air photographs and topographic maps, this landform has undergone little modification since the 1890's.

The top 20cm is considered to be PSA, but beneath this aggrading surface horizon lies the presettlement surface from 20cm to 30cm. Beneath the presettlement surface horizon is a pedogenic B horizon where argillans have coated channels in the soil fabric. Below the presettlement solum is a unit composed of fine sand and silt. This unit is interrupted by a clayey silt deposit where organic enrichment was encountered.

The clayey silt deposit is considered to be an alluvial unit and not an illuvial horizon. Some organic material was recovered in the core which suggests that this may have been a stable surface, and possibly a habitable one. The deposit also suggests that a change in the hydrologic regime of the valley may have occurred. Perhaps a period of climatically induced lower magnitude discharges influenced the alluvial record. However, at this time too little is known about the Holocene paleohydrology of the upper Mississippi river and the effects of climatic change on the river's erosional and depositional history to support this interpretation.

The site which is located along the main Mississippi river channel margin has a high potential for recovering cultural contexts in situ. The possibility of a multicomponent site exists since it appears that more than one surface exists. Due to the relative degree of soil development found in the presettlement surface, and from the absence of the late Woodfordian gravelly sand the 2m profile probably reflects a late Holocene chronology.

7.22 13 CT 218

Site 13 Ct 218 is located in Guttenburg, Iowa 360m north of the confluence of Minor's Creek and a backwater slough. The main navigation channel is 200m northeast. The site lies along the terrace margin and extends out onto the lowland floodplain below. Vegetation consists of lawn grass with bare patches along the terrace margin and silver maple, willow, and emergent aquatic plants on the lowland floodplain below. Site 13 Ct 218 lies within the limits of

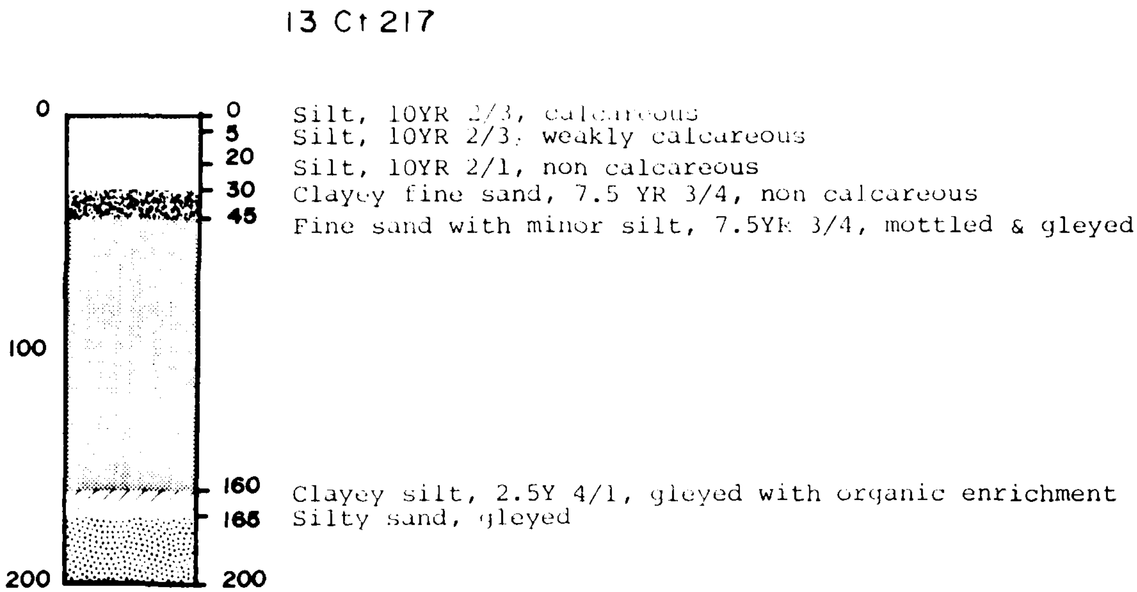


Figure 49: Profile, 13 Ct 217.

the Guttenburg Public Use Area (FIA-122). Elevation ranges from 605' AMSL on the lowland floodplain to 625' AMSL on the terrace. The site is immediately east of River Park Drive in southeast Guttenburg.

In May 1984 a pedestrian survey along the terrace revealed a shell button blank midden, a scatter of glass bottle sherds and the bowl and lower stem of a buff colored kaolin pipe. The high river stage prevented any survey of the lowland floodplain on this date. The site was revisited in June 1984 when the floodplain was exposed. Another scatter of shell button blanks was found across a swale to the northeast of the terrace margin site area (see Figures 28 and 29).

Table 22: 13 Ct 218 Inventory

1 buff kaolin pipe fragment (lower stem, elbow part of bowl)
1 metal buckle
3 button blanks
1 snuff can lid
8 sherds of glass including 3 bottlenecks

The kaolin pipe fragment, glass bottle sherds and button blanks are late 19th century with the button blanks being directly related to the button industry of Guttenburg.

7.23 13 GT 219 BIG POND SITE

The Big Pond Site 13 Ct 219 is located at the north end of Island 189, 700m south of Lock and Dam No. 10 on the east bank of a slough east of Swift Slough and west of Big Pond. Big Pond is part of a national fish hatchery complex built in the late 1930's. The construction of the fish hatchery has altered the landscape of the site. The pedestalled trees result from scraping of the surrounding soil during construction of a high berm surrounding the site. The immediate vicinity of the site has few trees due to the above mentioned activities. Identified species include river birch, silver maple, and oak. Much of the understory in this open area includes prairie species such as: cord-grass, bluejoint, big bluestem, switchgrass and a few unidentified forbes along with young honey locust, burr oak and black oak. Elevation is between 605 and 610' AMSL. The site was first visited by boat although the site is also accessible to pedestrians from Lock and Dam No. 10.

In October 1984 a pedestrian survey along the sandy foreshore and cutbank of 13 Ct 219 yielded a light scatter of prehistoric and historic cultural material. Although the material was recovered along only 50m of foreshore and cutbank, the site could extend farther to the north or south. This could not be determined because of the ground cover. One silt probe core, one bucket auger hole, and a bank exposure were described. Cultural material was sampled, and photographic records were made.

Table 23: 13 Ct 219 Inventory

Prehistoric:
- 9 chert flakes
- 4 chert shatter
- 1 burned limestone
- 1 water rolled pebble

Historic:
- 1 red clay brick
- 1 sherd of ironstoneware

No diagnostic prehistoric material was recovered. The red clay brick and ceramics are indicative of a late 19th century homestead.

Geomorphic Setting and Interpretation:

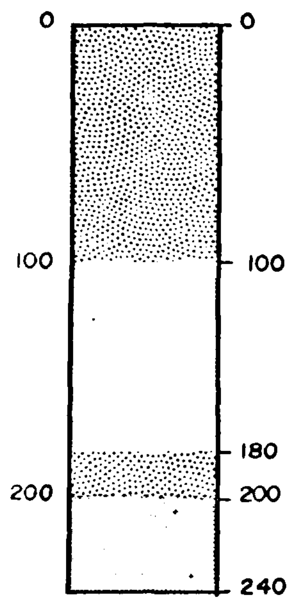
The site is located on Island 189 between the two major channels of Cassville Slough and the Mississippi River. The site is located on an island ridge adjacent to constructed fish hatchery ponds. The island is likely composed of mixed lateral and vertical accretion deposits although direct evidence regarding the nature of the deposits was obscured by the high degree of historical disturbance from the construction and maintenance of the nearby fish hatchery. Located about 2m above the present high water level the cores showed a profile consisting of recently deposited material (Figure 50).

Evidence that suggests recent historical deposition and reworking is first observed in the soil profile cores. Lack of pedogenic development is seen in the form of surface single grain structure, no surface organic matter enrichment, no translocation of material down root or worm holes, and abrupt textural contact with the lower silt unit. Further evidence observed from the bank exposure shows individual episodes of deposition likely a result of sheet wash from the artificially created pond spoil ridge located about 15m inland from the site. Poor stratigraphic agreement occurred between the bank exposure and the cores which indicates a high degree of disturbance. The air photo from 1940 delineates the fish hatchery and shows that the site was clear cut, while the 1961 photo shows additional dredging and expansion of the hatchery. Although this site reflects a high degree of disturbance with poor stratigraphic control, the southern end of Big Pond close to Ackerman Cut may harbor undisturbed cultural sites.

7.24 13 CT 220

Site 13 Ct 220 is located on the east bank of Swift Slough approximately 250m south of Lock and Dam No. 10 at the north end of Island No. 189. The vegetation at the site is predominantly burr oak and black oak with an understory of cordgrass, poison ivy, mulberry and a few other

13 Ct 219



Silty fine sand 7.5YR 4/4-5YR 4/4, mottled, non calcareous

Silt, mottled & gleyed, non calcareous

Silty sand, mottled & gleyed, non calcareous

Fine sand, mottled & gleyed, non calcareous

Figure 50: Profile, 13 Ct 219.

unidentified shrubs and grasses. Elevation is between 605 and 610' AMSL.

In October 1984 a pedestrian survey along the cutbank and foreshore of the east shoreline of Swift Slough yielded an historic scatter along approximately 30m of foreshore and above the cutbank on the surface. A soil pit was excavated to a depth of 60cm, the bucket auger continuing to 220cm, and the silt probe to the base. The profile was described and two samples were taken in addition to photographs.

Table 24: 13 Ct 220 Inventory

Historic Material:

- 1 red clay brick fragment
- 1 piece of mortar
- 1 blue-green and white marbled porcelain ware tea-kettle fragment
- 1 shell button blank
- 3 fresh water mussel shells
- A few limestone slabs seen but not collected

It is likely that this is the site of a late 19th century homestead. The red brick fragments, the mortar and clamshells along the foreshore and the limestone slabs on the surface above the cutbank indicate this as a house site. The one shell button blank and the other clamshells tie the site in, if only peripherally, with the button industry.

Geomorphic Setting and Interpretation:

The site is located on Island 189 along the channel margin of Swift Slough. It is on an island ridge composed primarily of mixed lateral and vertical accretion deposits with a thin mantle of vertically accreted silt. The presettlement surface horizon is located close to the present surface which indicates very little historical alluviation (Figure 51). The dark (10YR 1.7/1) organic rich former surface horizon is within 15cm of the surface. Historical alluviation is relatively slow because considerable mixing occurs between the present and former surfaces. The upper 24cm, which contains the two surface horizons, shows good root and worm activity and a well developed moderate medium granular structure. A small piece of what appeared to be charcoal was recovered at 20cm.

Beneath 24cm and extending to 35cm an argillic horizon is found with clay skins seen along ped faces and down root and worm holes. A gradual decrease in grain size is observed together with a change toward moderate medium subangular blocky structure. However, no apparent eluvial horizon commonly observed in forest alfisols was found above the B horizon.

The subjacent alluvial and pedogenic units suggest a complicated history of basin aggradation through the process of lateral accretion, while the siltier unit may indicate an episode of vertical accretion. No buried surface horizons were found in either of the lower sandy and silty units,

13 Ct 220

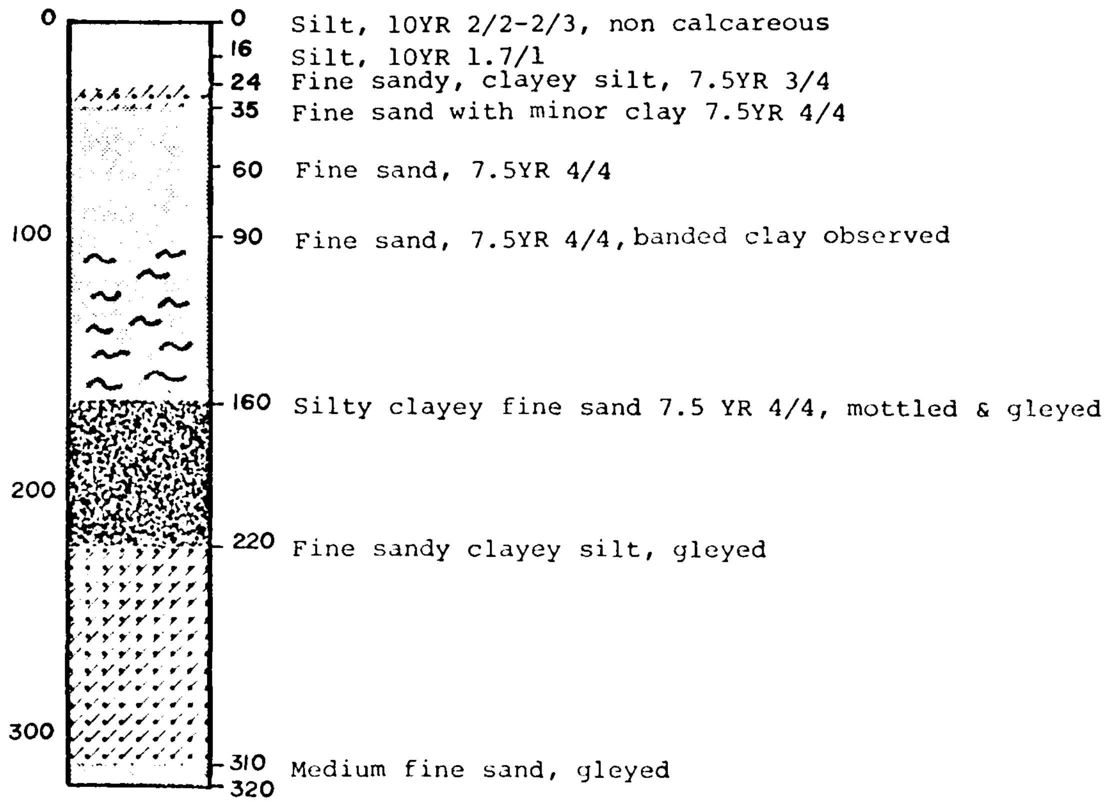


Figure 51: Profile, 13 Ct 220.

however, a banded clay horizon beginning at 90cm is observed in the fine sand matrix. This clay enriched horizon often seen in sandy sediments is thought to be a pedogenic horizon instead of an alluvial unit. Whether this horizon is in association with the illuvial horizon seen above or is in association with a relict surface is unclear.

From the study of the profile the evidence suggests that intact cultural horizons may exist particularly close to the surface. The relative absence of PSA in addition to developed surface and subsurface horizons indicates recent stability. However, beneath the pedogenic horizons aggradation of sand and silt has prohibited soil development and presumably involved episodes of both lateral and vertical accretion. The episodes have apparently occurred during the Holocene since no Late Woodfordian gravelly sand was encountered.

7.25 13 CT 221

Site 13 Ct 221 is located south of the Big Pond Site 13 Ct 219 on the east bank of a slough between Big Pond and Swift Slough and south of Lock and Dam No. 10 on Island No. 189. A dam at the northwest end of Big Pond lies ca. 225m to the north. The site is accessible either by boat or by pedestrians off Lock and Dam No. 10. Young river birch predominates with a thin understory of unidentified grass and poison ivy. Elevation is approximately 605' AMSL.

In October 1984 a pedestrian survey along the cutbank and foreshore on the east side of the slough was conducted. An iron frame of a "cart" was found on a wide gauge steel track. The short length of track runs perpendicular to the shoreline of the slough and slopes into the water. A white china soup tureen was found on the foreshore 25m south of the short length of track. One end of the dish is broken while the opposite end retains a handle and a base. The china tureen could indicate a late 19th century homestead. Unfortunately, vegetation cover obscured the shoreline and no other diagnostics were recovered. The cart and track may be related to the unloading and loading of supplies to, and farm goods from, homesteads on the island, or they could be related to the construction of the fish hatchery in the late 1930's.

7.26 13 CT 222

Site 13 Ct 222 is located 50m from the northwest end of Sweezy Island on the southwest side. A major channel called Piscayne Chute has cut a steep bank at the northwest end of the island. The site lies at the top of this steep cutbank. Sweezy Island is just below Jack Oak Island. The main channel separates the two islands. Silver maple is dominant with some willow along the shore. Some dead (Dutch elm disease) elms still stand on the southwest end of the island. The understory is poison ivy, woodnettle, grape

vine and mulberry. Elevation is just over 605' AMSL. The site is accessible by boat.

In October 1984 a pedestrian survey was conducted along the cutbank and foreshore and above the steep cutbank of Sweezy Island. A portion of a concrete foundation was located above the cutbank in a clearing. Two well pipes were also located a few meters from the foundation. These two pipes stand vertically and are isolated from the cutbank. No other material was recovered due to the steep nature of the cutbank and the dense vegetation at the site.

This is the site of an historic structure, probably a permanent home or possibly a cottage. The structure probably dates to the early 20th century since the foundation has not silted over.

7.27 THE HENKELS' SITE 13 DB 345

The Henkels' Site, 13 Db 345, is located 1km north of the Mud Lake Recreation Area at the confluence of an unnamed stream and the main channel of the Mississippi River. The site occupies about 1.5 acres on a terrace remnant on the south side of the valley mouth. Presently the site is on property owned and occupied by Mrs. Gladys Henkels. Elevation is 610-615' AMSL. The site is at the end of a road which runs parallel to the river north of Mud Lake.

The caretaker of the Mud Lake Recreation Area informed the field survey crew during the summer of 1984 that prehistoric artifacts had been recovered at the Henkels' home. Subsequently an interview with Mrs. Gladys Henkels provided information regarding the site. Human bones were found in the yard by her son Dave while digging a trench east of the house for a pipe. Several human bones were recovered at a depth of "five feet" including bones from a young individual. Some of the bones were "red". Many of the bones disintegrated overnight while exposed in the rain and others were subsequently lent out and never returned. Also misplaced were projectile points and pot sherds recovered from the garden southwest of the house. In October 1984 a pedestrian survey of this garden produced a number of chert flakes, a crude chert biface, a burned piece of limestone and a burned bone fragment.

Table 25: Henkels' Site 13 Db 345 Inventory

- 30 chert flakes
- 5 chert shatter
- 1 crude chert biface
- 1 burned limestone
- 1 calcined bone fragment

Although the surface collection produced no diagnostic artifacts, an unknown Woodland Period occupation of the site is indicated by the pot sherds. The human bone indicates burials, possibly a cemetery, of unknown age. The red stains could indicate the use of red ochre. This site lies

across the river from the Osceola Site, 47 Gt 24, and several other prehistoric sites on the Potosi terrace on the Wisconsin side.

(Selected representative cultural materials from archaeological sites are presented in Plates III-XVIII)

8. SUBSURFACE INVESTIGATIONS AT GPR AND SELECTED TOPOGRAPHIC LOCALITIES:

As previously noted, coring and excavations were conducted in association with ground penetrating radar survey localities and at selected topographic features. These features were selected for investigation either to complete subsurface transects or for unique topographic characteristics. Field work and interpretations are discussed.

8.1 JACK OAK SLOUGH: GPR RUN 1: (See Figure 5)

Field Work:
One bucket auger and two silt probe cores were taken at close intervals along the GPR transect. The profile description represents the first bucket auger hole (Figure 52). The site was photographed, and a total of 20 samples were taken for analyses and correlation with radar data.

Geomorphic Setting and Interpretation:
The site is on a low Mississippi terrace approximately at the same elevation as 47 Gt 419. The deposits seen in the profile are considered to be mixed lateral and vertical accretion sediments, however, the profile shows evidence of aeolian reworking.

Very little historical alluvium has been deposited on the surface. In fact, alluviation has been so slow that a weak developing Al horizon is seen at the surface. To a depth of 25cm remnants of an old plowed horizon are being reworked into the presettlement surface horizon by soil fauna and flora. The slightly darker, more organic rich, lower unplowed part of the presettlement Al horizon is seen from 25cm to 35cm. From 35cm to about 65cm a fine sand unit is observed with a weak, slightly darker pedogenic horizon seen between 45cm and 50cm.

A paleosol is seen beginning at 65cm and shows horizons extending down to about 1.35m. The organic enriched paleosol surface horizon continues to a depth of 90cm. Beneath this horizon is an argillic horizon evidenced by moderate to strong medium subangular blocky structure and by clay skins (7.5 YR 3/3) coating the blocky ped faces. Beneath the paleosol solum, structure and clay content rapidly decreases.

Medium fine sand with occasional granules of well rounded outwash granite, quartz, and basalt are seen in a unit

JACK OAK SLOUGH - GPR RUN I

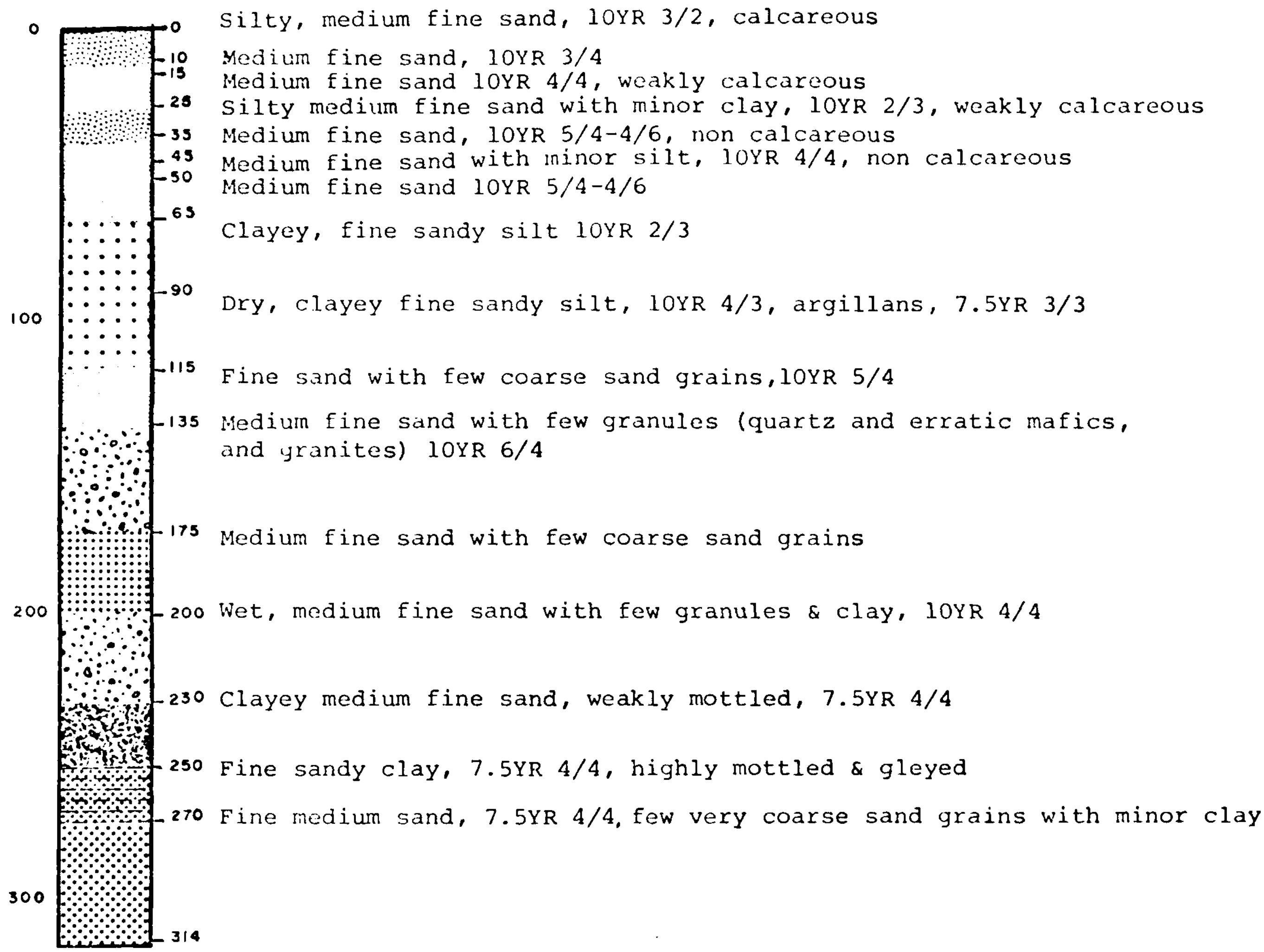


Figure 52: Jack Oak Slough, GPR Run 1.

from 1.35 to 1.70m. The granules grade out from 1.7 to 2.0m, but they briefly reappear with minor clay in a sandy unit that extends to 2.2m. Below 2.2m the clay increases reaching a maximum at about 2.5m but then decreasing and becoming a minor constituent in the sandy matrix for the remainder of the profile.

The outwash granules seen between 1.35 and 1.70m may reflect a surface that has experienced some degree of erosion. This unit has probably experienced aeolian erosion and reworking representing a deflated surface which perhaps is similar to that observed downstream at the Osceola site (Overstreet 1984b). An episode of fluvial erosion would tend to concentrate the granules into a better sorted lag. Regardless of the processes that led to the development of this unit, antiquity is suggested through the presence of outwash material.

Pedogenic and/or fluvial processes are responsible for the clay enrichment seen approximately at 2.0m and continuing to the base of the profile. The leaching of fine grained sediments from above has apparently enhanced the development of a clay enriched horizon near the base of the profile. How much of the clay is derived from alluvial deposition, if any, has not been determined. It has also not been determined whether the recent (post-lock and dam) higher water table has had an impact on the distribution of clay in the lower part of the profile.

Aside from the number of questions raised about the profile, at least two stable presettlement surfaces are obvious and possibly more exist. Consequently, this site may be critically important for defining Holocene sediment chronology and could harbor segregated prehistoric components.

8.2 JACK OAK ISLAND: GPR RUN 2: (See Figure 5)

Field Work:
Two silt probe cores were taken and described.

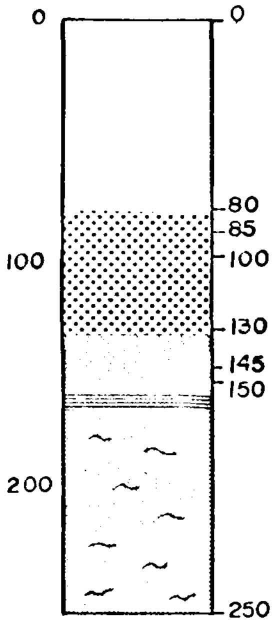
Geomorphic Setting and Interpretation:

The site is located on an island ridge primarily composed of lateral accretion deposits and is the easternmost ridge exposed on the island. The entire island illustrates a rather well developed ridge and swale topography that longitudinally parallels the present river course.

Both of the cores taken produced approximately the same profile (Figure 53). The top 80cm was composed of calcareous silt and interpreted to be post settlement alluvium. A thin weakly developed and likely eroded presettlement surface horizon begins at 80cm and extends only 5cm to 85cm. The rest of the profile shows units of fine and medium sand with bands of illuvial clay.

The best possibility of recovering cultural prehistoric context would exist at the base of the post settlement material. The thin former A horizon could contain cultural

JACK OAK ISLAND - GPR RUN 2



0 Silt, 7.5YR 4/4-10YR 4/4, calcareous

80 Fine medium sand, 10YR 3/3, organic enrichment
85 Fine medium sand, 10YR 6/4
100 Fine medium sand, 10YR 6/4

130 Very fine sand with minor clay, 7.5YR 3/4
145 Fine sand, 10YR 6/4
150 Fine sand, 10YR 6/4
3 cm. band of clay at 160 cm.

Thin clay bands continue to 250 cm.

250

Figure 53: Profile, Jack Oak Island, GRP Run 2.

materials but the evidence provided by the profile indicates that lower units do not contain any older stable surfaces.

8.3 JACK OAK ISLAND: GPR RUN 3

Field Work:

Two silt probe cores were taken and the profiles were described.

Geomorphic Setting and Interpretation:

This site is located on an island ridge primarily composed of lateral accretion deposits and is the second exposed ridge inward from Cassville Slough. A swale separates the previous site (GPR RUN 2) from this site. Like the previous site, this ridge also parallels the present main river course.

The profile description shows that historical post settlement deposition constitutes the surface 15cm (Figure 54). The calcareous PSA is mixed with the presettlement surface horizon beginning approximately at 15cm. Silty sand and fine and medium sand control the remainder of the profile with a pedogenic clay band occurring at 1.85m. The second silt probe core showed a similar profile with one exception; the illuvial clay band observed in the first core was not seen in the second.

The potential for uncovering cultural context would most likely be found close to the presettlement contact. The profile showed no evidence of stable surfaces in the lower sandy units and reflects a similar alluvial history to the previous site on run 2.

8.4 JACK OAK ISLAND TRANSECT: (Figure 5)

Field Work:

One silt probe core was taken and the profile was described. One sample of the profile was taken.

Geomorphic Setting and Interpretation:

The site is on an island ridge composed primarily of lateral accretion deposits and is approximately equidistant from the Mississippi River and Cassville Slough. In relation to the other two GPR sites, this site continues the transect west across the island at right angles to the ridges. The profile provides a good example of a large scale fining upward sequence which is associated with lateral accretion point bar deposits from the main river channel (Figure 55).

The surface of this site is capped with about 60cm of PSA in the form of calcareous silt. Like the other Jack Oak island sites, a weak presettlement surface is observed followed by units composed mostly of sand. Illuvial clay is seen beginning at 1.3m and extends down to the base of the profile.

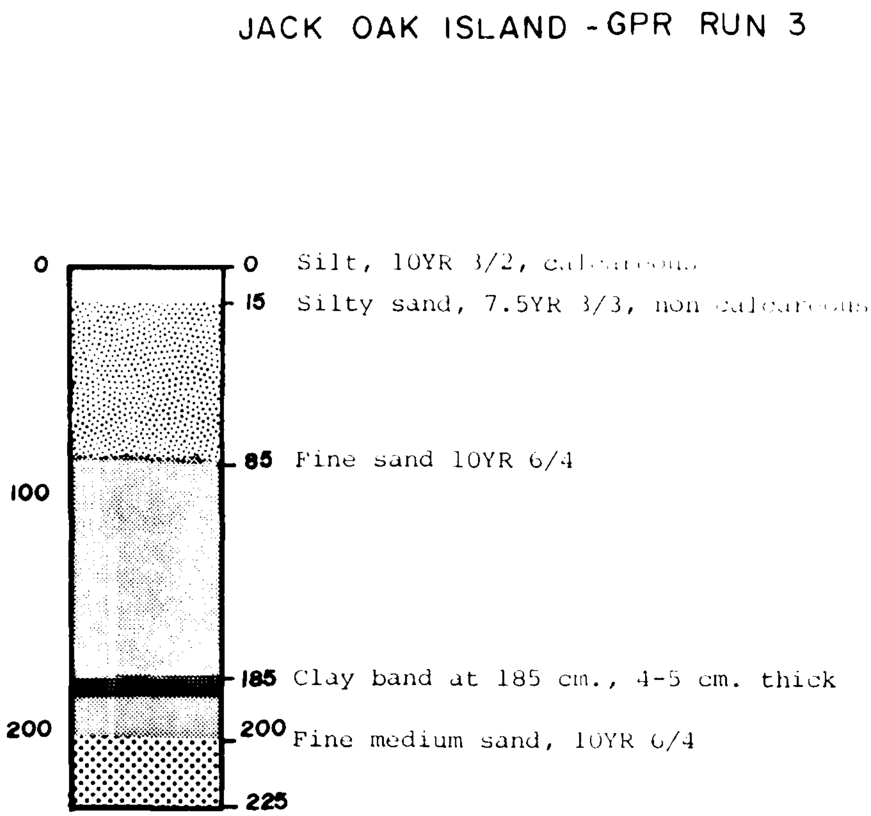


Figure 54: Profile, Jack Oak Island, GPR Run 3.

JACK OAK ISLAND

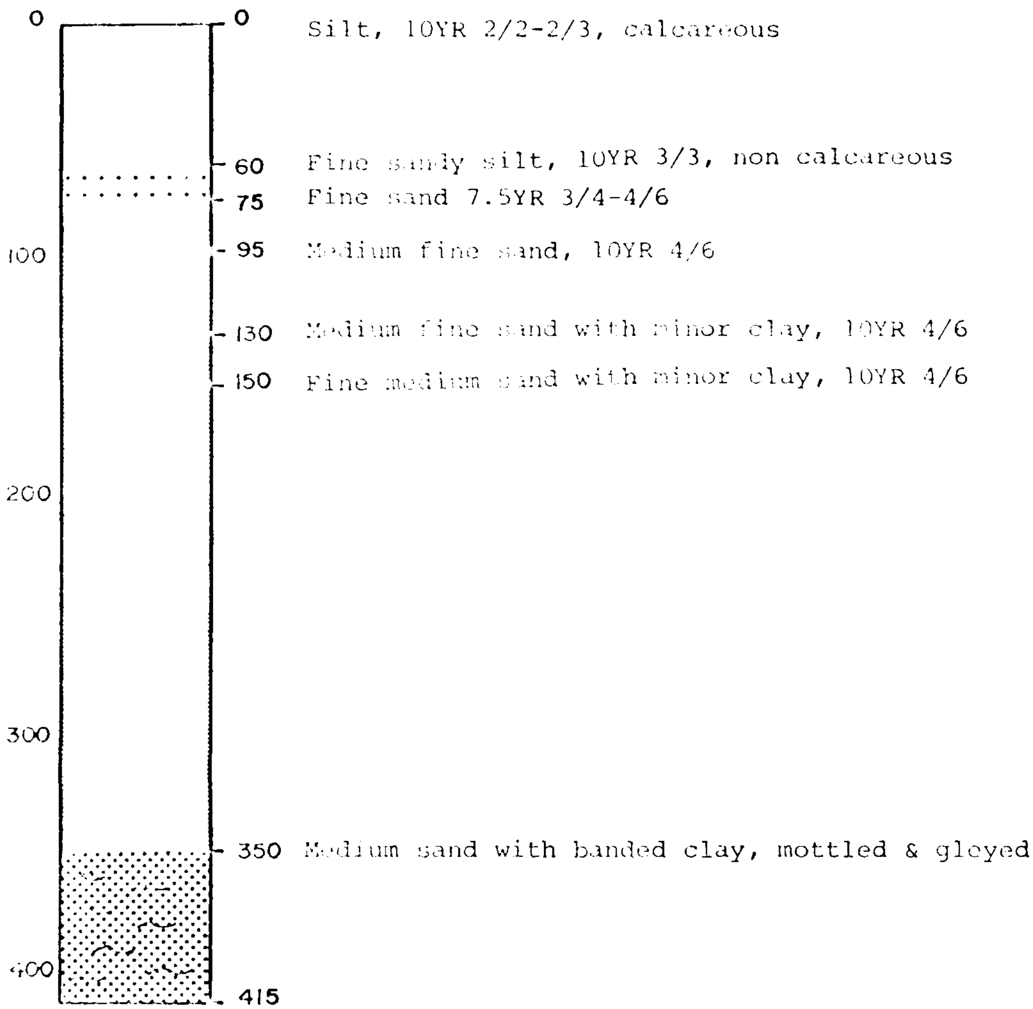


Figure 55: Profile, Jack Oak Island Transect.

Opportunity for recovering cultural context would be found close to presettlement surface around 60cm. If context was discovered, it would likely represent post-Archaic assemblages. The remainder of the profile which is composed mostly of sand with illuvial clay, shows no evidence of older stable surface development.

8.5 SAND CUT: (Figure 5)

Field Work:
One silt probe core was taken along the GPR transect at this location and the profile was described.

Geomorphic Setting and Interpretation:
This site is located near the downstream end of Jack Oak Island along the island margin and is associated with youthful mixed vertical and lateral accretion deposits. The surface is composed of post settlement deposits down to 35cm (Figure 56). A presettlement surface horizon is observed to a depth of 48cm. Below the A horizon, no subsurface or buried surface horizons were identified.

This profile suggests that the site has undergone limited pedogenic development. The field observations indicate that the location of the site on the downstream end of the island appears to be aggrading. The potential for finding pre-historic cultural sites at Sand Cut appears remote.

8.6 HOG HOLLOW: (Figure 5)

Field Work:
One soil pit was excavated and the profile was described. The pit was dug to a depth of 1m. Bank exposures were profiled and incorporated into the analysis.

Geomorphic Setting and Interpretation:
This site is located on a high Mississippi terrace adjacent to the east valley wall. The terrace is presumed to be a remnant surface formed during the river entrenchment episodes that occurred near the end of the Woodfordian and beginning of the Holocene. The surface of the Hog Hollow Site where the pit was dug gives no evidence of post settlement alluvial deposition.

The soil pit showed a dark organic rich surface horizon to at least 15cm. Below the surface horizon, texture coarsens becoming mostly sand, although bank exposures near the pit showed that a banded B horizon begins at about 1.5m.

This profile is similar to that observed at the nearby Grant River Public Use Area. The major difference between these two sites is that the Hog Hollow profile shows a better developed surface horizon which is probably a result of less historical disturbance. A more detailed study of the Hog Hollow Site can be found in Overstreet (1984b).

SAND CUT

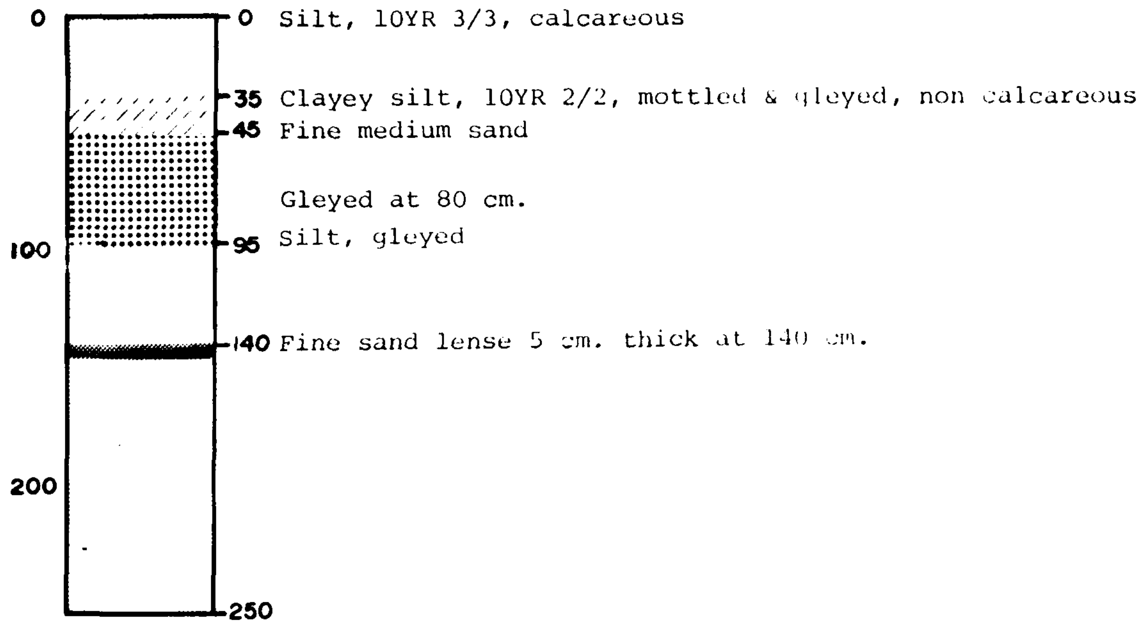


Figure 56: Profile, Sand Cut.

8.7 GRANT RIVER PUBLIC USE AREA: (Figure 5)

Field Work:

Several block excavations were performed in addition to over 80 bucket auger holes and several silt probe cores. Ground penetrating radar and resistivity were indirect methods incorporated into the study. Over 100 samples were taken and several hundred photographs were taken from the numerous profiles.

Geomorphic Setting and Interpretation:

Similar to the Hog Hollow site, this site rests on a high Mississippi terrace of presumably Late Woodfordian or Early Holocene age, and is composed mostly of outwash sediments. Eolian additions of silt and fine sand are found in the surface horizons. Historical flood sediments are found only on a few low lying areas of the terrace. These flood deposits most in cases comprise only the top few centimeters of the surface.

Most of the profiles observed at the site showed eroded surface horizons likely a result of cultivation and subsequent eolian transport. Considerable evidence suggests that this terrace has undergone periods of instability with surface reworking of sandy sediments possibly occurring several times during the Holocene. Cultural habitation may have been one cause of instability, while another cause may have been climatic change to a more arid circulation regime which would inhibit surface vegetal growth.

The basal units observed in most of the profiles consisted of pebbly medium sand and some bands of clay enrichment. The clay bands were usually encountered at about 1.2m while the granules and pebbles generally were found deeper than 2.0m. The accumulation of clay in bands is thought to represent pedogenic illuviation. Cultural material was not found penetrating into this illuvial unit, but instead was located in the sand and silty sand above. The reader is directed to Overstreet (1984b) for a detailed cultural and geomorphological discussion of the Osceola Site (47-Gt-24) at the Grant River Public Use Area.

9. NAVIGATION POOL 11 OVERVIEW-PROCESS AND HISTORY:

9.1 Introduction:

The following narrative summarizes the Pleistocene and Holocene events that shaped the landscapes of Navigation Pool 11. The discussion also reconstructs, in so far as present information allows, past life-ways in the study environs spanning the cultural continuum from first human occupation of the region through recent historic times. Where appropriate, references are made to significant

limitations in the data base, contemporary research questions are addressed, and spatial-temporal units with firm foundations are identified.

9.2 Regional Geology And Environment:

Navigation Pool 11 is situated on the southwest border of the Driftless Area, a region of intricate stream dissection where relief locally exceeds 600'. The topography is developed upon sandstone, dolomite, and shale bedrock of Paleozoic age. Within the pool these rocks dip gently southwestward so that the oldest rock exposed on the valley walls occurs at the north end of the Pool, the Decorah Formation of Middle Ordovician age. Rocks as young as Middle Silurian occur high on the bluffs. Throughout the length of the pool the Galena dolomite forms the most dramatic portions of the bluffs, in many places rising as vertical faces at the foot of the valley wall. The bedrock floor of the valley lies at depths more than 300' below the present floodplain (Whitlow and Brown 1963 note that the well of the Star Brewing Company in Dubuque "penetrated 337 feet of gravel, sand and silt before entering bedrock").

The basal alluvial sediments found throughout the Navigation Pool were likely deposited during the post-Kansan age. The last major episode of deep incision in the Upper Mississippi Valley presumably occurred during the Illinoian glaciation. Isostatic downbending under glacial load accompanied by *upwarping* in the the peripheral belt of the glacier could have accounted for major valley incision. Forebulge uplift in the Driftless Area of southwestern Wisconsin and northwestern Illinois steepened the valley gradient necessary for rapid and deep incision of the Upper Mississippi Valley (William and Frye 1969, Knox and Johnson 1974). As the Illinoian glacier retreated, the weight of the ice was reduced in the recently glaciated landscapes. These landscapes then tended to rebound while the forebulged Driftless Area began to subside. The steep valley gradient of the Mississippi was greatly reduced resulting in aggradation of the valley.

Surficial exposures of valley fill in Navigation Pool 11 are derived primarily from Late Wisconsinan (Woodfordian) (22,000-10,000 years B.P.) and Holocene events. Older deposits likely occur at unknown depths below Late Wisconsinan and Holocene fill. Their presence, however, aside from the Potosi (Whitlow and West 1966) and Dubuque (Whitlow and Brown 1963) localities, is undocumented. Church (1984) has reconstructed a valley cross-section from the Highway 18 bore hole logs indicating relative depths of younger valley fills above bedrock at an unknown depth (Figure 57). Consequently, the amount of valley fill, particularly in the upper reaches of Navigation Pool 11, is unknown. Further, the magnitude of pre-Wisconsin deposits is not well documented.

Episodes of valley aggradation and degradation continued throughout the Wisconsinan Age. This is particularly evident during the Late Wisconsinan or Woodfordian Substage when much of the sand and gravelly sand units were deposited in the Mississippi River valley. During the Late Woodfordian rapid alluviation occurred in the Mississippi and Wisconsin River valleys (Knox and Johnson 1974). The Mississippi River floodplain continued to aggrade until the Red River and Superior lobes retreated to the north at approximately 12,200 years B.P. (Clayton 1982). Upon retreat of the lobes, rapid entrenchment occurred in the valley. By 11,500 B.P. both the Red River and Superior lobes re-advanced causing renewed aggradation. This event was followed by subsequent entrenchment until approximately 10,800 B.P. The final episode of entrenchment occurred when glacial advances blocked eastward drainage of Lake Superior causing the discharge of meltwater through the Mississippi from 9900 to 9500 B.P.

The Upper Valley alternately aggraded and degraded in response to sediment load and discharge volume of glacial meltwaters. During periods of glacial advances bedload was introduced into the drainage network causing aggradation from high coarse sediment loads. However, when drainage was blocked, or when glacial lakes such as Lake Aggassiz formed, periodic high magnitude discharges would occur, perhaps with catastrophic magnitude with relatively sediment-free water, and valley entrenchment was again initiated.

These catastrophic discharges are not well documented. Flock (1983) suggests that these discharges carried little bedload, but did contain significant quantities of fine grained sediments. According to Flock, the clay rich sediment found on Mississippi River terraces (the Savannah Terrace) and on tributary terraces resulted from high magnitude discharges associated with the drainage of glacial lakes Agassiz and Superior between 13,000 and 9500 B.P. Meltwater containing red clays associated with glacial Lake Superior drained through the St. Croix River valley into the Mississippi Valley. Farther west, Lake Agassiz, containing grey clays, discharged through the Minnesota River valley into the Mississippi valley. This model proposes that discharges were of significant magnitude to create slackwater conditions required for the deposition of fine grained sediments. For a more comprehensive discussion regarding chronology of Woodfordian events in the upper Mississippi Valley and possible correlation of these events with archaeological deposits refer to Clayton (1982), Clayton and Moran (1982), Teller and Clayton (1983), Overstreet (1984a), and Church (1984).

Subsequent to the establishment of post-glacial topography, climatic fluctuations began to effect modifications of the Upper Mississippi valley landscape. For example, during the Early Holocene, and persisting into Middle Holocene, atmospheric circulation was significantly affected by wasting of the Laurentide ice mass north of the Driftless

Area. A zonal upper atmospheric circulation component dominated, providing a cool and relatively dry northwesterly flow out of Canada (Knox 1983). The persistence of a zonal circulation regime effectively blocked the intrusion of maritime tropical air masses derived from the Gulf of Mexico. As the Laurentide ice mass wasted farther to the north, a more westerly upper atmospheric component penetrated the upper Mississippi valley. This circulation pattern provided for the intrusion of Pacific derived air masses which continued to block the more humid maritime tropical air masses to the south. The result was a persistence of warm, arid Pacific air masses dominating the upper Mississippi valley during Middle Holocene times. From 9500 to 4700 B.P. in east central Minnesota there was an increase in the duration of Pacific air producing a 2 inch decrease in precipitation during the maximum penetration of westerly air about 7200 B.P. (Webb and Bryson 1972). There were likely long periods of droughty conditions in southwestern Wisconsin, northeastern Iowa, and northwestern Illinois, perhaps a century or more in duration.

Most investigators suggest, based on pollen studies and fluvial stratigraphy, that the upper Mississippi valley was marked by a climatic shift to cooler and more moist conditions around 6,000 B.P. Bartlein and Webb (1982), however, indicate that the Navigation Pool 11 environs may not have shared in this shift. They note:

> From 6000 to 3000 B.P., precipitation increased around 10% nearly everywhere in the Midwest except from Iowa to northern Indiana. The decrease in precipitation along the southern edge of the region is matched by a similar adjustment in the distribution of prairie-forb pollen and is accompanied by a decrease in temperature across the northern half of the Midwest. These changes probably related to an increase in the duration of Arctic airmasses in the north and a southward shift in the axis of the strongest westerlies. From 3000 B.P. to the present, precipitation increased across the southern edge of the region as the duration of the moist Atlantic (maritime tropical) airmasses increased there (1982: 76).

Whichever succession of events is correct, landscapes particularly sensitive to the dessicating effects of drought may have changed or lost their vegetative cover resulting in the reworking of surface materials and general instability of much of the drier portion of the landscape. The prevailing climatic regime determines the nature of the vegetation cover, while the type and density of vegetation colonizing a landform controls both the geomorphic and pedogenic processes working to change the landform. Webb, Cushing, and Wright (1983) and Wright (1976) have traced Holocene climatic changes throughout the Upper Mississippi

valley from the migration and succession of several vegetation species. The early advance and later retreat of the "Prairie Peninsula" suggests changes in air mass dominance during the Holocene. In response to increased aridity, the prairie/forest ecotone advanced eastward across the Iowa-Wisconsin border about 8000 B.P.

The waning of Laurentide ice continued during the Middle Holocene and by 6500 B.P. the ice had retreated to the Quebec/Labrador plateau (Wright 1983). This condition began to deteriorate the persistent zonal circulation pattern established earlier in the Holocene. Consequently, a meridional upper atmospheric circulation pattern was beginning to influence the climatic scenario in the Upper Mississippi valley.

Meridional circulation patterns provide the mechanism necessary for the mixing of unlike tropical and polar air masses. The result of this pattern causes an increase in the frequency and magnitude of precipitation events (Knox 1975). By the beginning of the Late Holocene about 4500 B.P., the Upper Mississippi valley was experiencing a more dominant meridional circulation regime. The prairie/forest ecotone responded by migrating back to the west, crossing the Iowa-Wisconsin border around 4000 B.P. (Webb, Cushing, and Wright 1983).

The Late Holocene climate which includes contemporary patterns is characterized by persistent episodes of either meridional or zonal circulation. The orientation of the jet stream over the North American continent determines whether the upper Mississippi valley will receive relatively cool/-moist, cool/dry, warm/moist, or warm/dry conditions (Knox 1979). Persistence of any one of these climatic scenarios changes the magnitude and direction of geomorphic processes controlling landscape evolution.

Current models, unfortunately, are not refined to a sufficient degree for correlations with generally conceived cultural reconstructions. They do, however, provide a framework for interpretation of the archaeological record. Thus it remains to be demonstrated how these fluctuations in climate and their subsequent effects on the landscape, which in turn surely generated modifications in the composition of flora and fauna in the region, stimulated human behavioral patterns. How, for example, are adaptive strategies of past populations reflected in the archaeological record? What are the specific patterned responses to cool/moist as opposed to warm/dry conditions in the region by participants in cultural systems? At this juncture such questions cannot be adequately answered. However, only by identifying and defining past landscapes and appropriately reconstructing past ecosystems can the means for answering these inquiries be developed.

9.3 Regional Prehistory:

The 1952 synthesis of Upper Mississippi valley prehistory published by Bennett downplayed the significance of the region:

> Of the various regional provinces of eastern United States archaeology, the northern Mississippi Valley perhaps is least deserving of the appellation, "glamorous." Up there are found no important and mysterious hints of Middle American influences; no cross-dating with Pueblo pottery; no vast towns with ceremonial plazas and elaborate temple mounds; no large and complex cultural remains of the classic stature of Ohio Hopewell or southern Middle Mississippi. The Aztalan Site, representing a Middle Mississippi push into southern Wisconsin, provides some exception to these generalizations, but it is an isolated case and its duration was short.
>
> In most cultural epochs, the northern valley was a story of migratory or semi-sedentary Indians who, only in the later periods, possessed the art of pottery-making, who lived in small and medium-sized villages and simple campsites, who often built burial mounds, and who subsisted mainly on hunted and gathered foods.
>
> Although lacking in glamour, the northern Mississippi Valley possesses a number of important historical problems. These may be listed briefly: (1) the emergence of western Woodland from Early Woodland state; (2) the emergence, blending, and disappearance of Hopewellian manifestations from and in the generalized Middle Woodland cultures (3) the origins of the western Upper Mississippi cultures; and (4) the status of late glacial and early post-glacial man in the north and east (Bennett 1952: 108).

How different are the perceptions of Upper Mississippi valley archaeology some three decades hence. Current research indicates a rich and comprehensive body of data now beginning to shed light on postglacial climate, vegetation, and landscape alterations. In turn, these lines of evidence make the Upper Mississippi valley a phenomenally rich research universe to explore and understand prehistoric man's response to the ever-present challenges of changing habitats. Further, because the area is a recognized hub of interaction in both prehistoric and historic times, exciting potentials exist to examine the effects of ideologies as well as material items on the region's residents during prehistory. Suffice it to say, the region holds no less promise, nor is the prehistory any less "glamorous", than

the middle or lower valleys, the American southwest, or any other region in North America. In fact, in many ways those regions pale by comparison with the Upper Valley.

The following cultural-historical framework reflects an attempt to summarize the general consensus of prehistorians regarding the occupational sequence of the Pool 11 locality. It is intended as a general overview and will thus likely result in important omissions. For the sake of brevity only four major units, PaleoIndian, Archaic, Woodland, and Mississippian, are utilized. These units in turn are refined to varying degrees based on the state of current research.

9.3.1 <u>PaleoIndian</u>:

Precisely when the first inhabitants entered the Tri-State locality is a point of theoretical contention among prehistorians. Some would argue for colonization of the region as early as 20,000 years ago. Others would vehemently state that a 12,000 year baseline is the only acceptable date. A second major issue relates to the geographic region from whence these first inhabitants migrated to the region. Most look to the west, if for no other reason than the chronology of archaeological discoveries, for the origins of PaleoIndians. Others are enticed by a growing body of information that substantiates PaleoIndian occupations east of the Mississippi River. Some have even come to view the PaleoIndian tradition as a basically eastern manifestation with some well known western variants. It should be noted, however, that most archaeologists rely heavily on typological frameworks defined from sites in the western United States. A third line of inquiry regarding these first inhabitants surrounds reconstructions of their lifeways. Environmental reconstructions suggest the habitat was one of extensive spruce parklands during the time of man's entry into the region. This habitat, along with the occurrence of Pleistocene megafauna, has fostered the characterization of PaleoIndians in the Upper Valley as big game hunters. Detractors of this model find solace in the lack of an undisputed association of PaleoIndians and Pleistocene fauna in the region. Thus, three major questions have yet to be resolved. First, the time of entry of man into the region is not documented. The eastern or western origins of these inhabitants have not yet been established. Finally, accurate reconstructions of PaleoIndian lifeways are not at hand.

It can be said that most of the limitations result from a lack of excavated contexts. Most information has been derived from surface finds, many of which are poorly reported. Although these factors limit refined culture history, not to mention the elusive but sought after "culture process", archaeologists have established some generally acceptable temporal units for PaleoIndian manifestations. For simplicity here these manifestations are categorized as early and late PaleoIndian.

Early PaleoIndian:

Fluted projectile points of the Clovis and Folsom forms are the diagnostic type fossils of the Early PaleoIndian period. Ostensibly these forms can be dated as early as 11,500 B.P. and significant numbers of these artifacts have been found in the uplands bordering Navigation Pool 11. Lynn Alex has traced the occurrence of fluted points in Iowa noting their distribution in Allamakee and Clayton counties (1980). Stoltman and Workman (1969) provide a similar distributional study in Wisconsin and have identified notable frequencies in uplands adjacent to the Mississippi River.

Beyond the distribution studies, little has been accomplished that would serve to resolve major research questions relating to Early PaleoIndian habitation in the Upper Valley. Palmer and Stoltman's 1976 attempt to reconstruct the association of the Boas mastadon and a fluted point manufactured from Hixton silicified sandstone is an interesting and notable attempt. However, no one would argue that the context has been demonstrated and the possibility remains, in spite of the effort on the part of the investigators, that the association is faulty.

Within the immediate locality of Navigation Pool 11, the horizon markers of Early PaleoIndian are rare and equivocal. One such example was reported by Bennett (1945: 13) from a terrace-floodplain context. This report was a restatement by Bennett of Nickerson's field notes:

> In the main ravine at Portage, buried in a stiff calcareous loess, we have found fine fragments of charcoal scattered over a space of 40 feet or more. A torrent of water...in May 1895, exposed this deposit and it continues to appear as the gorge thus formed wears back into the older flood plain of the ravine. This soil is probably, but not certainly, a re-distributed or modified loess. If not a modified loess it is either a river deposit or the base of the river terrace or stratified clay beds, which it seems to underlie. In any case, the charcoal seems to have been deposited in what was once soft mud, by the action of water, and is therefore by no means a recent deposit.
>
> In addition to this charcoal, about 120 feet down (south) the ravine, lying in a depression in the loess, was a pocket of ash and charcoal and a projectile point, all at the same depth as the other charcoal. The point is a crudely-chipped single flake, with a thinned base. The point is very vaguely Folsomoid in outline, but is similar to the Woodland material of the area (Bennett 1945: 13).

Bennett conducted additional investigations at the Portage ravine and with the aid of a geologist confirmed the early context:

> The soil profiles checked perfectly with Nickerson's descriptions. A local geologist states that the upper deposit is certainly the remains of the Galena River terrace, deposited in the ravine in post-glacial times. Since the point and charcoal were found in the lower clay, the authenticity of the find as "early" seems to be substantiated (Bennett 1945: 13).

While this fluted point context is just south of Navigation Pool 11 in Jo Daviess County, Illinois, it is the only well described context of possible Early PaleoIndian materials in a floodplain setting. These early artifacts are quite rare in lowland situations. The question remains: is this a function of collector bias and easy access to cultivated lands of the terraces and uplands? Or, does this truly mean that the earliest occupants of the Upper Valley simply bypassed the alluvial environments of the floodplain? Given the magnitude of post glacial floods, valley incision, and the reworking of sediments, have these early landscapes been completely destroyed? Clarification of these questions awaits in-depth study of the floodplain sediments and correlation of archaeological data. Definition and dating of buried Early Holocene surfaces is the most promising and economical means of securing information regarding the earliest occupations of Navigation Pool 11.

Late PaleoIndian:

The distinctions between Early and Late stages of the PaleoIndian tradition are based almost exclusively on artifact styles. Acceptable temporal limits of the late stage range from approximately 8,000-4,000 B.C. based on stratigraphic grounds provided by Salzer (1969, 1974) and on typological bases provided by Mason (1963). Unfluted lanceolate projectile points with distinctive colateral or transverse flaking patterns serve as the diagnostic type specimens and these may be subdivided into stemmed and unstemmed categories. The non-stemmed forms would include such types as Agate Basin, Plainview, Brown's valley and others. Stemmed types are represented by Scottsbluff and Eden.

Several reconstructions of Late PaleoIndian lifeways have been developed for this region and Quimby's (1960) Aqua-Plano tradition and Mason's (1963) Late PaleoIndian culture stage share many characteristics. Mason defines the stage:

> By Late PaleoIndian I refer to the cultural stage and stone technology generally following the use of fluted points and generally preceding the emer-

> gence of Archaic cultures with their distinctly different chipped stone industries, ground and polished stone tools, employment of copper, and evidence of the development of regional traditions in part consequent to the "settling in" and subsistence utilization of varying ecological situations. This stage and period-they are not the same thing though they have frequently been confused-have been called Late PaleoIndian or Early Archaic depending on the not always explicit frame of reference, and Quimby has characterized them as dominated by the "Aqua-Plano" tradition (1960: 34-42). For reasons propounded elsewhere I use the term Late PaleoIndian to refer to the general cultural stage (and also period it occupied) manifested, in the Upper Great Lakes, by a variety of lanceolate points and associated chipped stone tools made by apparently highly nomadic hunters and sometimes found in primary association with fossil beaches formed during the early post-glacial period (Mason and Irwin 1960: 55, Mason 1962: 233) (Mason 1963: 200-201).

As with interpretations of Early PaleoIndian lifeways, regional reconstructions tend to mirror those from the Plains sites which often are indicative of big-game hunting. Such interpretations really derive from our superficial understanding of Late PaleoIndians in the Upper Mississippi valley based on a lack of excavated data and a poor understanding of environmental changes during the Holocene. The vast majority of data are from private collections of surface finds in the hands of avocational archaeologists. We have no controlled data to assess utilization of the lowland floodplain during this era. Stoltman provides such an interpretation:

> All factors considered, however, such as wide dispersal and absence of permanent sites in the upper Mississippi Valley region, along with close typological resemblances with Plains big game hunters, it seems reasonable to regard Plano point makers as the last practitioners of a big game hunting lifestyle in the upper Mississippi Valley region, probably during the interval 8000-6000 B.C. (1983: 205-206).

In conclusion, the gaps in the current literature and in unpublished records are wide. While a few lanceolate projectile points have been found on terraces along Pool 11 (Overstreet 1984a), they are absent, thus far, from the floodplain, and inadequate information is at hand to attempt any reconstruction of past lifeways. Mason's recent synthesis seems the most cogent statement reflecting the

archaeological record of these early residents in the Great Lakes:

> Unfortunately for ease of discovery, these earliest inhabitants were few in number and lived in such small-scale, widely scattered, nomadic, and lightly equipped societies that they left only a scanty archaeological record. And because they were the first people, erosion has had a longer time to gnaw on their remains.
>
> As if in modest compensation for these latter handicaps, the PaleoIndians sometimes left their traces at locations that make little sense when compared to the camp and village preferences of later peoples: at lonely windswept perches high atop hills or even mountain spurs, or on the relatively slighter elevations of ancient strandlines miles away from the nearest water or any other now recognizable resource. Such locations have only recently come to make some sense as archaeologists have grown to realize how much the environment has changed since men first infiltrated the Great Lakes and the northeast corner of the continent. So while the traces of these ancient folk are rare compared with most later times, here and there they signal like beacons on the raised shores of ancient lakes. They invite correlations among past human actions and the extinguished conditions by which they were partly shaped (1981: 82).

Of paramount importance is Mason's focus on environmental change. There is now little doubt that old surfaces (late Woodfordian) remain intact under alluvial fans and beneath Holocene sediments on the floodplain. The extent to which these now buried landscapes were used and how they were exploited by Plano cultures is not yet documented.

9.3.2 Archaic:

The term Archaic was initially defined to apply to stone tool types which in comparison to those of PaleoIndians seemed to imply primitive form and function. Somewhat later in the development of methods and techniques which incorporated subsistence and settlement studies, interpretations began to emphasize the regional aspects of Archaic cultures with emphases focused on seasonal patterns within well defined regional environments. For a summary of the evolution of definitions of the Archaic Tradition refer to Fowler (1959: 7-8).

Most current perceptions of Archaic populations reflect the highly nomadic hunting and gathering patterns of earlier PaleoIndians being replaced by groups who have a more

enduring sense of territory wherein adjustments or adaptions are made to specific environmental and ecological settings. Within particular habitats, a diverse range of plants and animals are exploited in a well defined seasonal round. As time passed, greater emphases were placed on the extraction and processing of plant foods including roots and tubers, seeds, and other vegetal materials. Again through time, as these populations expand their resource base and improve collection and processing techniques, predictable demographic adjustments occur, the archaeological record apparently showing population size and density increasing. To monitor and compare these various developments most archaeologists utilized three arbitrarily defined segments of the Archaic: Early, Middle, and Late. As with any imposed classificatory device, the classic aspects seem well founded in the record while the transitional periods often do not manifest any measurable and distinct features. These temporal divisions have been succinctly summarized for the Eastern United States by Griffin (1967):

> Early Archaic - 9,000-6,000 B.C. Lithic assemblages are characterized by a variety of stemmed and basal notched projectile points. Strong evidence ties Early Archaic populations to riverine habitats.
>
> Middle Archaic- 6,000-4,000 B.C. Lithic assemblages begin to incorporate utilization of pecked and polished or ground stone tools, ostensibly for processing of plant foods and indicative of reliance on this aspect of subsistence. Again, emphases are indicated for the exploitation of riverine habitats and extraction of fresh water mussels is suggested.
>
> Late Archaic- 4,000-1,000 B.C. The most flamboyant expression of the Late Archaic period is the development of pan-regional mortuary complexes or cults with long-distance exchange that emphasize exotic commodities.
>
> Judging from the size and apparent duration of cemetery areas notable increases in population size and density are suggested.

In spite of the fact that few Archaic sites from any of the previously noted subdivisions of the Archaic have been fully explored and the apparent absence of Archaic sites from floodplain contexts, Griffin's model, because of its emphases on riverine habitats, is appropriate. Adaptation to riverine habitats is well established for Archaic populations in other regions of the Eastern United States. For the Pool 11 locality specifically and the Upper Mississippi valley generally, floodplain sites of this

period are not identified, perhaps with the exception of the Pool 10 locality (Overstreet 1984a). In addition, upland components are few in number. These factors notwithstanding, current models indicate that Archaic populations likely bypassed the lowland floodplain habitats and focused their efforts on the exploitation of terrace and upland resources.

Geier and Loftus have conducted the most extensive archaeological survey in the region (1976). Their efforts which covered over 22 miles of terrace and uplands along the Mississippi River in Grant County provided an extensive body of information relating to archaeological site distributions. However, only 5 Archaic sites, one of which is the excavated Osceola Site (47 Gt 24), are reported. The authors state:

> Only five Archaic sites are identified (two in SA-II and three in SA-III), one being the Osceola Site, a major Old Copper cemetery site. Given the large estimate of burials at the cemetery (500 suggested by Ritzenthaler 1958: 197), the small number of habitation sites is interesting. While the Osceola cemetery is placed on a secondary terrace of what had been the Grant River in SA-III, the heaviest concentration of cultural debris occurs on the high benchland north of the junction of the Platte and Mississippi Valleys, in SA-II. No habitation sites were found near the Osceola site and only one upland unit was identified (in SA-III).
>
> No evidence of Archaic activity was found along the Mississippi River or McCartney Branches in SA-V, the Grant River Valley in SA-IV, or the Sinnippee Creek area of SA-I. Fifteen Archaic components were identified in 1974, however, north and east of the junction of the Platte and Big Platte Rivers (Geier and Loftus 1975): the heaviest activity being the multi-stage Archaic sequence at the Brogley Rockshelter.
>
> While the small number of sites in the study area prevents clear interpretations of Archaic settlement behavior, when combined with data obtained in 1974 certain statements can be made. Archaic activities were riverine in orientation, though, despite the burial complex on the banks of the Grant River in SA-III, the settlement emphasis apparently bypassed the Mississippi Valley proper in favor of associated tributary streams such as the Big Platte (Geier and Loftus 1975: 97).

Stoltman also notes the meagre record of Archaic utilization of the lowland floodplain:

> Our recent research in the low floodplain of the Prairie du Chien area has recovered a few Osceola points, the oldest artifacts presently known to us in this habitat, but no evidence yet of an intensive exploitation of the floodplain at this time. It appears that the Old Copper people were primarily upland-adapted hunters and fishers who are nontheless likely candidates for initiators of the process of more intensive utilization of floodplain resources in the more northerly segments of the upper Mississippi Valley region (1983: 215).

Boszhardt and Overstreet (1983) conducted lowland floodplain survey in Navigation Pool 12 and failed to identify any sites that could be classified as Archaic in geomorphic contexts other than the surfaces of Late Woodfordian terraces. No sites that pre-date Early Woodland were identified on (in) floodplain settings (1983: 173-174).

All of these surveys and investigations share a common feature--they failed to adequately investigate buried surfaces of sufficient age to harbor archaeological deposits that predate Woodland stages on the Mississippi River floodplain.

Recent studies, Boszhardt and Overstreet (1982, 1983), Overstreet (1983, 1984a), and Church (1984) have demonstrated significant Holocene and post-settlement (A.D. 1850) deposition on the lowland floodplain of the Mississippi River. Overstreet (1984a) has located archaeological deposits buried by as much as 15.0' of sediments. These studies serve to demonstrate an important source of bias in regional models of Archaic site distributions that emphasize so-called upland adaptive strategies.

From these recent studies we can now state a reasonable alternative to existing settlement models. Given the low frequency of components in upland contexts, and, given the reconstruction of upland and terrace habitats during the mid-Holocene (see Overstreet 1984b), most upland environments were unsuitable for habitation due to low resource densities. Rather, emphases were placed on floodplains early in the Archaic continuum, a locality where subsistence opportunities were most concentrated and abundant. Archaeological components of probable appropriate age have been identified on buried landscapes (Overstreet 1984a). However, until these sites can be more fully investigated, this hypothesis cannot be proven.

The data collected during the course of these investigations have not provided significant evidence of Archaic occupation. In large part this is due to the depth of archaeological site burial in Navigation Pool 11 and to high water levels which prohibited investigation of exposures of suitable age for the presence or absence of Archaic sites. The bulk of previously unreported information is

derived from collections of scattered surface finds on the terraces adjacent to the Mississippi River. The proximity of these implements to the present river shore is meaningless, however, as much low-lying land has been submerged with development of the navigation pool. The following summary reviews Archaic materials.

Early Archaic:

A variety of large and moderate sized projectile points can be associated with Early Archaic occupation of the region. Few published accounts of components of Early Archaic sites have been reported for the region. One notable exception is the Bass Quarry Site reported by Stoltman, Behm and Palmer (1984). The site is primarily a lithic processing station yielding significant numbers of Hardin Barbed projectile points, preforms, and cores in various stages of reduction. No other Early Archaic sites have been reported for the Navigation Pool 11 vicinity.

Surface collections from both the Potosi and Cassville terraces indicate a relatively wide range of projectile point types that can be placed within Early Archaic frameworks. Such easily recognizable styles as Hardin Barbed, St. Charles or Dove-tailed, and Thebes have been recorded in very low frequencies (Overstreet 1984b). While provenience is not exact in many cases, these forms are presently restricted to terrace settings and often are represented by a single specimen in local collections.

More common are a variety of stemmed and notched forms with bifurcate bases. These have been identified as Early Archaic in origin by Fitting (1964). Again, primary concentrations are derived from the Potosi and Cassville terraces with no specimens known from the lowland floodplain. From the current information we can suggest only that Early Archaic populations inhabitated the region from approximately 6,000-8,000 B.C. Insufficient data are at hand to foster interpretations other than that Early Archaic populations, perhaps low in number and density, made sporadic use of terraces adjacent to the Mississippi River resulting in the deposition of minimal evidence of their activities. There is little doubt in my mind that additional sites will ultimately be discovered deeply buried in alluvial fill in the floodplain.

Middle-Late Archaic:

By 5,000 B.C. evidence for occupation and utilization of the region by prehistoric residents is more substantial. Literally hundreds of large side-notched points that can be classified within the Raddatz, Osceola, Godar, and Helton types have been recovered from surface and sub-surface contexts. A site which has received much attention is the supposed Old Copper cemetery Osceola Site (47 Gt 24). There is significant data to now question the assignment of the

site exclusively to "Old Copper" (Overstreet 1984b). Rather, the Osceola Site mortuary locality appears to have been used over a long period of time. In addition, the site has been deflated, perhaps several times during the Holocene. More importantly, the recent investigations demonstrate that Osceola points are not necessarily mortuary items, many having been found in various stages of manufacture, reutilized, and from floodplain contexts. From the perspective of the Potosi terrace (Overstreet 1984b), there is little doubt that Middle-Late Archaic settlements were on river bottoms proper with only transitory, functionally specific activities being carried out in terrace or upland settings. This interpretation is consistent with the concept of broad-spectrum Late Archaic economies with intensive focus on riverine resources. Further, while the Late Archaic mortuary behavior at Osceola has been radically overstated, there is some evidence of typical burial pattern and long-distance trade in such commodities as copper, Galena cherts, and mineral galena (Overstreet 1984b). Again, these interpretations can be confirmed only by excavation of floodplain sites which are quite difficult to locate given the depth of site burial.

9.3.3 Woodland:

Numerous investigations of Woodland period sites from floodplain and terrace settings have resulted in relatively good descriptions of material culture. Reconstructions of mortuary patterns, settlement patterns, and subsistence patterns are less refined. In reality lifeways likely varied little, at least initially, from the preceding Archaic patterns. Later in the Woodland continuum, corn horticulture along with the use of other cultigens is often viewed as a stimulus to population growth and stability, However, the time of the initial appearance of maize and its dietary significance are not well understood providing considerable room for disagreement among prehistorians. Two traditional material elements used to segregate Woodland from Archaic components are the occurrence of ceramics and the construction of burial mounds. Woodland period sites far outnumber those of earlier periods and existing records appear to be biased in favor of mounds and mound groups when compared with habitation sites. Several Woodland sites have been excavated and preliminary reports have been published. However, no detailed analyses of Woodland stage communities has been provided specifically for the Pool 11 environs. Thus, the subsequent discussion is regional in nature but certainly applicable to Navigation Pool 11.

Aspects of material culture, radiocarbon chronologies, subsistence and settlement studies, and mortuary site investigations have fostered division of Woodland period sites into three temporal units--Early, Middle, and Late Woodland. Again, classical examples of each subdivision are more readily recognized with interstices less fully compre-

hended. As well, variations in nomenclature from state to state and from one investigation to the next are considerable. The inability or unwillingness to apply existing nomenclature often makes it difficult to correlate the various defined phases, complexes, and foci from one locality to another. In the most general sense, the traditional divisions of the Woodland cultures are based on absolute time on the one hand, and various materials aspects on the other. For convenience, Theler's succinct summary of Woodland milestones can be used to establish loose parameters (1983).

Early Woodland which includes the Ryan and Prairie phases and Red Ocher mortuary complex spans the period 300 B.C.-A.D. 100. Ceramics include a variety of incised over cord marked styles with bosses, nodes, and fingernail impressions. Lithic implements known from association include stemmed styles accommodating the Kramer and contracting stemmed types, Waubesa, Dixon, and related forms. Mound construction is suggested by Logan (1976), although the association with Early Woodland is problematical. Middle Woodland includes the Havana-related Trempealeau and McGregor phases initially formulated by McKern (1931) and refined by Benn (1978, 1979) and Stoltman (1979). These are followed by regional developments sans Hopewell accoutrement, locally defined as the Millville or Allamakee phases. The former unit with its elaborate burial mound ceremonialism appears of short duration bracketed by the years A.D. 100-300. The latter, with less elaborate mortuary behavior and greater regional characteristics, persists from approximately A.D. 200-600. The Late Woodland Effigy Mound culture with its recognized cord and fabric impressed ceramics types spans a period from A.D. 600-1000. Sometime during this period corn horticulture is well established. Benn (1979) has applied the term Keyes phase to this manifestation. Finally, Theler (1983) applies the nomenclature "Terminal Late Woodland/Mississippian" to describe and interpret the sporadic occurrence of collared wares (e.g. Aztalan Collared, Point Sauble Collared, Starved Rock Collared), Oneota styles, and occasional Middle Mississippian-like ceramics with sub-angular shoulders and rolled rims. The nature of all post-Effigy mound cultures in the locality of Navigation Pools 10, 11, and 12 is not clear although more enduring sites seem restricted to uplands and terraces.

Early Woodland:

Two ceramic styles have most frequently been utilized to identify Early Woodland components in the study area. Incised over cord marked styles and a style of vessel with thick walls, flat bottoms, interior cord marking, and coiled manufacturing techniques indicate an Early Woodland presence for most archaeologists. Type names are numerous and often without merit. Incised over cordmarked styles include such

types as: Black Sand Incised, Dane Incised, Brock Lake Incised, Spring Hollow Incised, Prairie Incised, and Fox Lake Incised. Fortunately, the occurrence of thick walled vessels has been limited to a degree where the barrage of "type names" has been less imposing and restricted to one of two regional types. The first, Marion Thick, is an apparent companion to the more northerly distributed type, La Moille Thick. The relationships between these essentially ceramic traditions within the Tri-state locality are the subject of some contention which makes it necessary to review both the theoretical and empirical bases of interpretation.

During the 1950's Logan defined the Ryan Focus based on his work in northeast Iowa and to lesser degree in southwest Wisconsin (1959: 277). Based primarily on the occurrence of Marion Thick ceramics and the utilization of red ocher in mound interments, Logan identified the limitation of this definition. Benn has redefined the Ryan Complex:

> The Ryan Focus was named by Logan (1959: 277) for the Early Woodland manifestation. As Logan admitted, the evidence for this manifestation is scanty, and I do not feel justified in modifying "focus" to "phase," as will be done for later manifestations discussed here. Rather, the ubiquitous term "complex" will be used. My justification is that since 1959 relatively little new evidence of Early Woodland culture has been revealed to either support or refute the original Ryan Focus concept.
>
> The Ryan Complex is recognized from the finds of incised-over-cordmarked pottery similar to the Illinois type Black Sand Incised, and of other finds of Marion Thick in village sites. Additionally, several conical burial mounds, notably mounds in the Ryan group (Orr n.d., 5: 89) and mound 43 in the Sny Magill group (Beaubien 1953a) contained submound floors covered with red ocher which were thought to be related to the Red Ocher Phase in the Illinois Valley (cf. Griffin et al, 1970). Unfortunately, no Early Woodland single component habitation has been found in northeast Iowa. Another difficulty in defining this complex is that artifactual remains were very scarce in the excavated mounds, and two of the Ryan mounds and mound 43 at Sny Magill also contained Lane Farm cord impressed and stamped vessels (1979: 51-52).

Benn's comments regarding the difficulty of identifying Ryan Complex sites in northeast Iowa are germane to Pool 11:

> Why is the Early Woodland culture so difficult to define in northeast Iowa? The reasons appear to

> confront us in multiples of interrelated factors. There is the question of the precise typological definition of incised-over-cordmarked pottery, since Logan's type, Spring Hollow Incised (1959: 144), was placed in the Middle Woodland time period. Another problem is that the other Early Woodland pottery type Marion Thick, is extremely rare and always poorly preserved in Iowa sites. A third problem has been alluded to, that is, we have yet to locate either a pure Early Woodland habitation or a mound containing grave goods. Such sites may exist, and, indeed, have already been excavated (presumably by Orr n.d.). However, the overwhelming majority of excavations were conducted by the Iowa Archaeological Survey prior to 1950 when the technical knowledge of stratigraphic excavation was yet to be refined up to present-day standards. It would seem, therefore, that much useful information was lost in the field excavations or is buried once again in laboratory collections (1979: 52-53).

Based on the limited data available, Benn attempts reconstruction of the nature of Early Woodland culture in the Upper Mississippi Valley in the Tri-state locality:

> It is a matter of speculation that Early Woodland populations were relatively low in comparison to the subsequent period of Havana culture. This is inferred from the usually scant collections of Early Woodland pottery which always comprises a fraction of a percentage in large ceramic collections from habitation areas. It is also possible that the transition from Archaic to early Woodland occurred only shortly before the advent of the Havana Tradition in northeast Iowa, and the paucity of evidence may be attributed to the brief existence of Early Woodland culture. Still another factor which contributes to the obscurity of Early Woodland culture is that subsequent Havana, Allamakee, and Effigy Mounds cultures deposited such a large quantity of remains that this earliest Woodland complex was literally buried or so diffused throughout mixed deposits that it is virtually invisible. This last statement, however, assumes that Woodland cultures for the most part occupied many of the same living sites and utilized the same landforms for mound constructions. There is evidence that this assumption is at least partially correct (1979: 53).

More recently, Theler (1983) and Stoltman (n.d.) have segregated the Ryan complex by definition of a later phase, the Prairie Phase, which dates to approximately A.D. 100. The

Prairie phase is recognized by two excavated components at 47 Cr 186 and 47 Cr 348 in the Prairie du Chien locality. These sites represent Black Sand-related summer shellfish procurement and processing stations (Theler 1983). Stoltman (n.d.) explains the late date, relative to Illinois Black Sand, as a function of a "time-transgressive" phenomena. The unconvincing assumption here is that a culture-lag concept applies. Incised over cord marked styles were ostensibly developed in the Illinois River Valley by 600 B.C. and, following the passage of one half a millenium, reached the Upper Mississippi Valley.

For a critical review of the Black Sand stratigraphic contexts, readers are referred to Munson (1982: 1). This author provides still another interpretation of the relationship of the Ryan Complex (Marion culture), the Black Sand related manifestations (i.e. Prairie Phase), and the subsequent Havana related Middle Woodland components in the region. Munson presents a model which interprets the development of the incised over cord marked ceramic style, and hence Black Sand, as a northern manifestation:

> I propose that all of the cultural complexes with sandy tempered, noded, incised over cordmarked ceramics are representative of a cultural tradition centered to the northwest of the Marion-Havana area which is unrelated, in any developmental sense, to the Marion-Havana continuum. This tradition, which I suggest be called the Black Sand Tradition, began in Early Woodland, at a time more or less contemporary with the beginning of the Morton/Caldwell phase of the Havana Tradition. At this early date (ca. 300-400 B.C.?) some groups of this basically northern tradition extended (or perhaps intruded) into the Illinois Valley area, where they exerted limited "cultural influence" (whatever that term means) on some aspects of the decoration of some early Havana Tradition ceramics (i.e. Morton Incised). By Middle Woodland times encompassing Spring Hollow (in part)/ Brock Lake/Prairie phase and the later portions of Fox Lake, this tradition has retracted to the north and northwest, where its bearers participated, weakly and primarily as recipients, within the Havana-Hopewell sphere of influence, comparable in this regard in many ways to the situation with the Crab Orchard Tradition that lies to the south of the Havana Tradition.

In addition, Munson notes:

> Given the contrast between the northern and southern areas, I will postulate that all of the Black Sand sites in the Illinois valley area (as well as, perhaps, the adjacent portions of the

> Mississippi and Lower Missouri) represent seasonal base camps of a single kind that were reached by the major waterways, and probably by watercraft, by individuals who resided for the other portions of the year in northeastern Iowa-southwestern Wisconsin-southern Minnesota area (1982: 11-12).

Both Ryan Complex and Prairie Phase sites are known for the Pool 11 locality. However, it is not possible at this juncture to evaluate the major theoretical premises. First, as Stoltman suggests (Theler 1983, Stoltman n.d.) we may interpret the emergence of the Prairie phase as a time-transgressive phenomena wherein influences from the Illinois valley, over the course of 500 years reach and modify local Ryan Complex cultures with resultant additions of some Black Sand characteristics. We can also accommodate, and actually prefer, Munson's model which hypothesizes a northern development with intrusions into the Illinois valley area on a seasonal basis for short-term functionally specific purposes (1982). The primary problem with Munson's model is the suggested 300 B.C. estimate which is inconsistent with the Mill Pond (47 Cr 186) radiocarbon chronology. Perhaps Mill Pond is a relatively late manifestation of this regional development. In spite of these opposing viewpoints relating to the origin of Early Woodland cultures in the region, we can state, based on the work of Theler (1983) Boszhardt (1982), and Stoltman (n.d.) that Early Woodland cultures, both Ryan Complex and Prairie phase, show strong articulation with the lowland floodplain habitat with special emphases on the exploitation of rich fresh water mussel beds. Unfortunately, we have no data from floodplain excavations other than those related to shellfish procurement and processing. Until such information is available we can only speculate with regard to other Early Woodland sites and activities on the floodplain. However, I, for one, will be surprized if future investigations fail to reveal more substantial settlements on the Mississippi River bottom for both Archaic and Early Woodland periods.

Middle Woodland:

Early investigations of Middle Woodland sites emphasized excavation of mounds and frequently attempted to "measure" the influence from more classical Hopewell neighbors situated to the south of the Navigation Pool 11 locality. Examples of this orientation include McKern (1931) and Bennett (1945). Somewhat later, Baerreis (1949) appropriately noted that regional variations were likely of equal or greater importance than "central basin" influences. Recent investigations have resulted in the definition of several local Middle Woodland phases and serve to de-emphasize the influence of Havana Tradition cultures to the south while placing focus on local and regional developments. Again, terminology is somewhat confusing and arbitrary. State

geography sometimes serves as the conceptual boundary between Middle Woodland phases. In any event, four phases have been recognized: (1) Trempealeau (McKern 1931, Stoltman 1979); (2) McGregor (Logan 1959, 1976, Benn 1978, 1979); (3) Millville (Freeman 1969, Stoltman 1979); and (4) Allamakee (Logan 1959, 1976, Benn 1978, 1979). No significant characteristics serve to differentiate the Trempealeau and McGregor Middle Woodland phases and they are virtually interchangeable reflecting local manifestations of the Havana Tradition. Millville and Allamakee stand in similar positions, the former reflecting post-Havana development in southwestern Wisconsin while the latter denotes the same phenomenon in northeastern Iowa.

Trempealeau/McGregor Phases:

Of the McGregor phase Benn Notes:

> The McGregor Phase (Logan 1959: 286) has been named for the local manifestation of the Havana Tradition in northeast Iowa. That the McGregor Phase (ca. 0 A.D./B.C. to A.D. 300) belongs within the Havana Tradition has been demonstrated in a detailed ceramic analysis (Benn 1978), the essence of which can only be summarized here. McGregor Havana ware pottery incorporates most of the Illinois types as defined by Griffin (1952) and described by Loy (1968), except that the curved-dentate stamped types are relatively uncommon in Iowa. The Naples Dentate Stamped type comprises the majority of decorated sherds in most collections. Other common Illinois Havana traits, such as projectile point forms and the characteristically large habitation areas in the Mississippi River valley are also present in northeast Iowa (1979: 56).

In contrasting McGregor with Havana, Benn suggests that in spite of a somewhat impoverished inventory of elaborate mortuary goods, behavioral similarities are strong. "In general, throughout the Hopewell experience the emphasis seems to have been on carrying out ritual obligations and performances which reinforced ideological and supernatural beliefs" (1979: 56). Thus, if McGregor folk are considered impoverished, it is in material rather than in spiritual arenas.

Stoltman's time estimates for the Trempealeau Phase vary slightly from Benn's chronology for McGregor. He assigns the Trempealeau Phase to a period from 100 B.C. to A.D. 400 and characterizes the time as a period during which Hopewell influences are relatively strong (1979).

The constructs of McGregor and Trempealeau phases are derived from excavation and analyses of mortuary sites and many of the investigations date to the late 1800's. Exotic

commodities such as bear canines inlaid with river pearls, ear-spools, obsidian, knife river chalcedony, quartzites, copper, and silver are reported items of grave furniture and also serve to denote long-distance trade. Unfortunately, almost nothing is known of the domestics features of either Trempealeau or McGregor phase culture. Settlement and subsistence are suggested to be heavily oriented to riverine habitats and resources and such sites are few in number in upland contexts. Theler's recent summary of the Trempealeau phase is as comprehensive as any with regard to domestic features.

> Stoltman (1979: 137-138) has defined this phase with its Havana-related ceramic series as the "period of Hopewell interaction in southwestern Wisconsin." Survey activity in the Mississippi River floodplain has identified a small number of sites with Trempealeau phase ceramics. None of these has been excavated and we currently have no subsistence information for this phase. Although more than 20 shell middens are known in the Prairie du Chien region, none appears to contain Havana ceramics.
>
> This phase may be of short duration in this portion of the Mississippi Valley. It <u>may</u> be 'grafted on' to an existing Woodland base and does not seem in any sense to be an <u>in situ</u> development. The flood plain-terrace position of habitation sites is perhaps suggestive of a strong riverine subsistence orientation. This phase, like the preceding one, may be characterized by small human populations. If this is the case, seasonal movement by family groups into the dissected uplands may not have been necessary to obtain a sufficient annual supply of deer meat and hides (1983: 277).

Millville/Allamakee:

The flamboyant and pervasive Hopewell mortuary cult with its elaborate mound construction, conspicuous consumption of wealth in the form of grave goods, and pan-regional trade and interaction, lost its ideological grip on the populations in the Upper Mississippi valley. This regional development ostensibly without status differentiation, long-distance trade and interaction, and elaborate mound construction is identified as the Allamakee phase in northeast Iowa and the Millville phase in Wisconsin.

With regard to the northeast Iowa manifestations Benn states:

> The transformation from McGregor Phase to Allamakee Phase culture is best documented by ceramics. Linn Ware (Logan 1959: 206), the

> Allamakee Phase pottery evidences a substantial departure from Havana ware and the development of a unique regional style of ceramics (1978: 215-284).

As well:

> Hypothetically, the Allamakee Phase is best described as a culture in transition. As the demographic patterns in the Upper Mississippi Basin changed with the establishment of the Havana-Hopewell, as the overall population probably was increasing, and because the Mississippi floodplain was not enclosed by a meager environment for intensive harvest collecting peoples, there was a shift to increasingly dispersed settlement patterns beginning as early as A.D. 200 (1979: 60-61).

In Wisconsin Stoltman (1979) has defined the late Middle Woodland counterpart of the Allamakee phase and, based on the type station, has applied the term Millville phase. Undoubtedly, the most comprehensive report of a late Middle Woodland site in the region is provided by Freeman (1969). Excavations at the Millville Site encompassed an area of 90 x 110 feet and yielded the remains of 14 domestic structures and an additional 176 features including hearths, burials, and refuse/storage pits (Freeman 1969: 28). Faunal remains from the Millville Site were analyzed and reported by Pillaert (1966) and, along with other evidence, fostered the interpretation that the site was occupied for most, if not all, of the year.

Theler, in his presentation of Woodland economic strategies provides a somewhat different interpretation for the Millville phase:

> There is good evidence for upland winter site occupation and flood plain-terrace summer occupation. The basis of winter subsistence was large mammals, particularly the white-tailed deer, while summer occupation seemed to rely on mussels and fish harvest. Carbon isotope analysis (Bender et al. 1981) indicates maize was not yet an important element in the diet. This is to some degree supported by a lack of carbonized maize in the extensive floral assemblages recovered in features at the Mill Coulee Shell Heap (C. Arzigian, personal communication) (1983: 278).

Thus the reconstruction of Middle Woodland lifeways in the Pool 11 locality is quite well known from some features of the archaeological record and is poorly documented in other aspects. The Havana-related McGregor and Trempealeau phases did not apparently develop *in situ*. Whether they

are 'grafted on' local Prairie phase or Ryan Complex peoples is not possible to ascertain at this point. During the period of Havana influence mortuary behavior, although perhaps "impoverished", is clearly elaborate and easily compared with patterns in the Illinois River basin.

The growth and spread of Millville/Allamakee populations denotes the death-knell of the pan-regional mortuary cult and a reassertion of localized materials and behavioral patterns. This trend is continued and expanded into the subsequent Late Woodland period.

Late Woodland-Effigy Mound Tradition:

Late Woodland occupations throughout the Navigation Pool 11 locality, with the exception perhaps of some of the post-A.D. 1000 manifestations, are classified within the Effigy Mound Tradition (Hurley 1975). Among the prominent aspects of these prehistoric cultures are the construction of low earthen tumulii, often in the form of animals (hence the term "effigy mound", although it seems certain that simple geometric forms outnumber effigy forms), the development of a distinctive form of textiles applied to the exterior of ceramic vessels, and a conceptualized settlement and subsistence pattern that reflects hunting and gathering with, perhaps, limited horticulture. Storck (1972), for example, has characterized Effigy Mound populations as hunters and gatherers who likely ranged throughout a given territory in small groups during most times of the year with occasional coalescence during times of resource concentration. Mallam (1976a) has suggested that this coalescence functioned within the cultural system for performance of necessary social and ritual behavior.

In the northeast Iowa locality, Effigy Mound Tradition components have been placed within the Keyes Phase (Benn 1976, 1979). He notes:

> The Keyes Phase (Benn 1976) presently is the comprehensive designation for the Effigy Mound culture of the Northeast Iowa locality. This phase is one variant of the Effigy Mound Tradition (Baerreis 1966, Hurley 1975) which is found throughout southern Wisconsin and in small adjacent segments of Minnesota and Illinois. The Effigy Mound manifestation of Wisconsin has not been divided into units comparable to the Keyes Phase, although variants have been proposed prior to the modern era of archaeology (McKern and Ritzenthaler 1949: 39).

While the archaeological record relating to mound construction and interment of the deceased in mounds is well known, settlement and subsistence behaviors are not documented. For example, Stoltman notes:

> It is primarily on the basis of Madison Ware ceramics that habitation sites are assigned to the Effigy Mound Culture. One of the greatest handicaps to understanding Effigy Mound Culture, however, is that so few habitation sites have been excavated. As a result, we know almost nothing about subsistence, although it is widely assumed that they were not farmers but foragers (Rowe 1956: 51, Mallam 1976: 59-65) (1983: 228).

Theler's report of investigations on the lowland floodplain of Navigation Pool 10 provides substantial new data relating to subsistence and settlement, although his data is by and large restricted to one seasonal aspect of these patterns (1983). He notes that during the Late Woodland stage the first evidence for non-residential mussel processing stations occurs:

> It is at about A.D. 800 that we find extensive mussel processing stations at non-residential areas (e.g. 47Cr310). Also at this time, carbonized contexts, suggesting some dietary reliance on tropical cultigens (C. Arzigian, personal communication) (1983: 279).

Very minor evidence is at hand which is indicative of Late Woodland occupation that would post-date A.D. 1000 on the Mississippi River floodplain in the Tri-state locality. A few sherds of Starved Rock Collared and Aztalan Collared ceramics have been recovered (Overstreet 1983, Theler 1983). It is not clear whether this late Late Woodland development should be placed within the framework of the Effigy Mound Tradition as Hurley (1975) suggests. Currently, there is no sound body of data that can be used to associate collared wares with the construction of Effigy mounds. Some individuals have presented alternative models wherein the term "terminal Late Woodland" is applied. Theler notes for example that Terminal Late Woodland dates from approximately A.D. 1,000-1,600 and:

> This includes the final portion of the Effigy Mound Tradition. The occurrence of collared ware ceramics at Mill Pond marks a post A.D. 1000 Woodland occupation in this region. In some areas (in the vicinity of La Crosse, Wisconsin, and the upper Iowa River valley, Iowa), the upper Mississippian Oneota tradition becomes established, with large villages supported in part with a base of maize agriculture. At least one Middle Mississippian site, the Fred Edwards Site (47Gt377), is reported on the Grant River in Grant County, Wisconsin (1983: 20).

As this review of the current literature indicates, there are several areas of the Late Woodland Effigy Mound Tradition that are poorly known. Most scholars would agree that the derivation of Late Woodland is related to post-Havana Allamakee/Millville phase populations. In particular, such ceramic types as Lane Farm Cord Impressed serve as a technological and material bridge between the Late Middle Woodland and early Effigy Mound cultures. Features of mound construction and associated mortuary behavior, Mallam's (1976a) criticisms notwithstanding, are relatively well documented. Subsistence and settlement patterns, however, have not been given any in-depth considerations from the flood-plain and surrounding environs, most data having been recovered from upland rockshelter sites. The so-called terminal Late Woodland cultures, those that post-date A.D. 1,000, can be interpreted only from very scanty remains. It is not certain that these late manifestations should be classified within the Effigy Mound Tradition.

9.3.4 <u>Mississippian Cultures</u>:

Limited presence of Oneota (Upper Mississippian) and Middle Mississippian groups has been noted in Navigation Pools 10, 11, and 12. For the most part identification rests upon a few ceramic items devoid of any other evidence that would indicate substantial habitation areas. To the south of Pool 11 in Jo Daviess County (Bennett 1945) the Apple River Focus is characterized by large, densely occupied settlements. To the west, the Upper Iowa River with its well known Orr Phase villages (Wedel 1959) presents an interesting contrast to Pool 11. Finally, to the north in Vernon and LaCrosse Counties in Wisconsin large Oneota Village sites have been identified on the terraces. Such sites, based on present survey and excavation, are absent in the Pool 11 locality.

Middle Mississippian sites are equally rare. A single habitation site, the Fred Edwards Site (47 Gt 377) stands as the single example, quite removed from the Mississippi River situated on a terrace of the Grant River in Grant County. The factors which would serve to explain the relative scarcity of Mississippian sites in Navigation Pool 11 are not understood. One ostensible reason, however, seems confirmed. Population density after A.D. 1,000-1,200 was not a factor. Rather, during the terminal Woodland as described by Theler (1983) and into the Early and Middle Historic periods as defined by Quimby (1960) there is little evidence of human occupation. Why Oneota and Middle Mississippian populations would not have found this relatively vacant area suitable for habitation is an important question for future research.

9.3.5 The Historic Period:

Marquette's narrative of his voyage down the Mississippi in the mid-17th century is perplexing in that from approximately the mouth of the Wisconsin River, south of Prairie du Chien, and the confluence of the Illinois and Mississippi Rivers he encountered no inhabitants. As he described his historic voyage: "We happily paddled into the Mississippi the 17 June (1673) with a joy which I am unable to express" (Hamilton 1970: 134), and he throughout found entirely "uninhabited" lands. There were no signs of human life on the Mississippi River until the party reached "100 leagues" south of the Wisconsin where they met with the Peoria, a people of Illinois (Donnelly 1968: 215). C. Mason suggests (Overstreet et al. 1983: 73):

> It might be reasonably inferred from Marquette that the Mississippi area, at least the stretch between the Wisconsin River and the Illinois, was vacant land. This was anything but the case: at that time of the year the Dakota as well as other peoples were not yet in place in their summer habitations, and Father Marquette luckily did not meet any of the groups regularly using the Mississippi as a means for making war.

Unfortunately, records and literature search, review of private and museum collections, and archaeological survey of Navigation Pool 11 failed to yield information relating to the occurrence of Historic period sites prior to the late 18th century.

This apparent hiatus of archaeological sites dating between approximately A.D. 1300 and A.D.1780 may be viewed as tentative verification of Marquette's 1673 observations. Dwindling population numbers and low site densities are recorded for many areas of the Midwestern United states during this era, European disease being the most often cited cause. The validity of this population decline can be resolved only by additional research. Nonetheless, the first confirmed information we have regarding occupation of the Pool 11 environs by historic Indians occurs in 1783.

The historic migrations of the Fox-Sauk tribal groupings are well documented, beginning with their hostile relations with the French in what is now the state of Michigan. Some groups moved into northeastern Wisconsin, and ultimately found their way to the Upper Mississippi valley. The earliest recorded settlement in Navigation Pool 11 is situated on the Turkey River bottom in Millville township. A Fox village was established at this location in 1783. This village was visited by Jean Perrault during that year and by Zebulon Pike in 1805 (Ricord 1892, Price 1916). The village was deserted by the time of the arrival of the steamboat Virginia in 1823 (Peterson 1932, 1941).

Somewhat later, the Fox established control over the Mines of Spain region south of present day Dubuque. Their

relationship with Julien Dubuque is well chronicled (Jackson 1966) and after his demise, Euro-Americans were not allowed direct access to the Mines of Spain. Another village of 12 abandoned structures was reported on the Cassville terrace in 1820 (Lockwood 1856; Schoolcraft 1821; Brown 1906).

The Winnebago also were attracted to the region during the late historic period. Most of their settlements and camps are recorded on the Wisconsin side of the Mississippi River, perhaps in deference to established Fox territories on the Iowa side. Winnebago sites were located at Potosi, the Big Platte River, Indian Creek, a tributary of the Platte, and on the terrace north of Sinnippee Creek. Most of the Winnebago sites are associated with lead mining activities.

By the 1820's various traders conducted a brisk commerce with local Indian residents, principally the Fox. Sites are known from various localities on islands in the Mississippi River (Boszhardt and Overstreet 1983b). One site is now inundated by the Navigation Pool. In 1825-26 Etienne Dubois established a post on an island near the mouth of the Little Maquoketa River. Dubois was licensed by Joseph Rolette, acting agent of the American Fur Company. These commercial ventures were of short duration as the "lead boom" attracted Euro-American miners to the region and Native Americans were soon displaced. In turn, the mining era stimulated the events associated with the pioneer history of the region.

9.4 History Of American Settlement In The Upper Mississippi Valley 1805 To Present

9.4.1 American Exploration

Following the Louisiana Purchase of 1803, which more than doubled the area of the United States, efforts were made by the American government to explore the vast expanse of territory that stretched between the Mississippi River and the Rocky Mountains. The first of these explorations in the Upper Mississippi valley was the Zebulon M. Pike expedition of 1805-1806 (Pike 1811, Coues 1895, Jackson 1966). Lieutenant Pike, accompanied by twenty men, ascended the Mississippi River from St. Louis in the spring of 1805 faced with the task of negotiating treaties with the Indians, securing conformity with the laws of the United States by fur traders in the region, selecting potential sites for American forts, and extending geographical exploration. Although Pike failed in getting British trappers to comply with government policies regarding the fur trade, he successfully negotiated a treaty with the Dakota for a large tract of land immediately west of the Falls of St. Anthony and at the strategic confluence of the Mississippi and St. Peter's (Minnesota) Rivers for the establishment of military outposts. During the upriver journey, Pike and his men camped

on the east side of the Mississippi River opposite the mouth of the Turkey River near present-day Cassville (Coues 1895: 32-33).

Pike's exploratory mission in 1805 was followed by a second government expedition in 1817 under the command of Major Stephen H. Long, who ascended the Mississippi in a six-oared skiff as far as the Falls of St. Anthony. Long was ordered to chart the Mississippi River as far north as Prairie du Chien, follow the Wisconsin River as far east as the portage to the Fox River, describe the course of the Fox to Green Bay on the shores of Lake Michigan, and record information on the Indians and the country he traversed (Kane, Holmquist and Gilman 1978: 8). In his journal Long describes the scenery, his meeting with Indians, and early settlements along the river. Long passed through the study area in June of 1817 while enroute upriver, and again in July as he returned to St. Louis. During his journey, Long visited Dubuque's mines but made no recorded observations of any other cultural features of the landscape within the Study Area.

Long returned in 1823, accompanied by the geologist William H. Keating. This expedition ascended the Mississippi as far as Fort Snelling (established in 1819), then headed up the St. Peter's and Red Rivers before turning east along the international boundary. The expedition was joined at Fort Snelling by the Italian explorer Giacomo Beltrami, who left the party near Pembina in his search for the source of the Mississippi River. Keating's narrative (1959) of the voyage is particularly noteworthy for its descriptions of the scenery and the Indians living along the region's waterways.

The Pike and Long expeditions marked the beginning of the passage of several explorers, soldiers, and surveyors into the Upper Mississippi region via the "Father of Waters" and its tributaries. Some of the more notable expeditions that passed through the region in the ensuing years were those led by Colonel Henry Leavenworth in 1819 to establish a permanent military outpost at the confluence of the Mississippi-Minnesota Rivers, as recommended in earlier reports by Pike and Long; Schoolcraft in 1820 and 1832 to discover the source of the Mississippi River; and Lieutenant Stephen Kearny, accompanied by the topographer Albert M. Lea, in 1820 and again in 1835 to explore and map the interior parts of "Iowaland".

Between 1835 and 1850 extensive scientific and geological surveys were conducted in the Upper Mississippi valley. The earliest geological surveys in the region were conducted by the British geologist George W. Featherstonhaugh in 1835 and by the geographer Joseph N. Nicollet, who travelled extensively throughout the region from 1836-1839 while preparing an illustrative map of the hydrographical basin of the Upper Mississippi region. Important surveys were also performed by the geologist David Dale Owen, who conducted the first detailed surveys of the lead districts of Wisconsin,

Illinois, and Iowa in 1839, the Chippewa land district of Wisconsin and northern Iowa in 1847, and a three year survey of the mineral deposits of Wisconsin, Iowa, and Minnesota, beginning in 1848. The geological surveys conducted during the 1830s and 1840s by John Locke, William H. Bell, Joseph Le Conte, and John Pope contributed to the knowledge of the region's mineral wealth, topography, and fluvial features.

The government survey reports and maps prepared by the early topographers and geologists (Schoolcraft 1821, 1834; Keating 1824; Featherstonhaugh 1836; Lea 1836; Owen 1840, 1844, 1848a, 1848b, 1852; Nicollet 1843; Locke 1844; Bell 1844; Pope 1855) were widely circulated and consulted by later surveyors, settlers, and travellers. The works of Schoolcraft and Nicollet are particularly significant since they contain some of the first truly scientific ethnographic notes on Native American groups residing in the Upper Mississippi region.

9.4.2 The Military Frontier

The early American explorations into the Upper Mississippi valley and the outbreak of war with Great Britain in 1812 served to convince the United States government of the need to develop a stronger military presence in the region and to control the routes used by the American and British fur traders to reach the Indians residing in American territory. To accomplish this end, garrisons were posted and forts built at Detroit, Chicago, Mackinac, Green Bay, and elsewhere to protect the northwestern frontier (Prucha 1953). Although no permanent military frontier posts were established along the Mississippi River within the Study Area, three were located nearby - Fort Crawford (1816-56) located on an island at Prairie du Chien about two miles above the mouth of the Wisconsin River, Fort Armstrong (1816-36) built at the southern end of Rock Island, and, for a short time, Fort Atkinson (1840-49) located on the Turkey River at the present site of Fort Atkinson, Iowa (Prucha 1964: 57-68). Fort Crawford was built on the site of an earlier American fort called Fort Shelby which was captured and later burned by the British during the War of 1812 and renamed Fort McKay (Mahan 1961). In 1828, due to problems of frequent flooding, the site of Fort Crawford was abandoned and a new fort was erected on a commanding elevation on the prairie above the rise of the river, but which remained easily accessible to a landing for boats.

The early military forts became the first urban centers of the region and fostered a period of much activity. Many an enlisted man found himself engaged in building roads and bridges, farming, cutting lumber, and the like. Timber was cut at or near the forts for use in the construction and frequent repair of stockade walls and buildings and as fuel for the fort's cooking ovens. To facilitate this water-powered sawmills were built for sawing lumber for use at the fort. The nearest government-built waterpowered sawmill in

the area was constructed in 1828 about three miles up the Yellow River across from Prairie du Chien.

The garrisons stationed at the forts in the Upper Mississippi region were dependent on the regular arrivals of foodstuffs, munitions, and supplies sent upstream from St. Louis by keel-boat, barge, and, in later years, by steamboat. Practically everything that was needed at the forts from buttons and sewing needles to salt pork and flour was secured through these scheduled arrivals.

Life at the frontier outposts, however, was not easy. Sickness and disease were widespread and epidemics of smallpox, cholera, scurvy, and malaria, while common among the soldiers, were particularly devastating to the local Indian populations living nearby (Harstad 1959-60, 1960a, 1960b, 1963). Adding to the soldier's misery and discomfort were long, bitter cold winters, seasonal floods, and the constant threat of attack, either real or imagined, by hostile Indians.

By the 1820's the American government had succeeded in extending its military presence throughout the upper Mississippi region for the purpose of enforcing its Indian policies and regulating the fur trade. In doing so the military played an important pioneering role in the settlement of the frontier. The protection afforded by the frontier forts attracted the first permanent American settlers composed, for the most part, of discharged officers and enlisted men and their families, voyageurs, and Indian agents. It was the military that first surveyed the rivers and lakes, improved river navigation, built dams and mills, and served as the political and judicial centers in the region (Prucha 1953). The presence of the military, particularly the officers and their families, also helped set the social tone of the early settlements by promoting education and religion and by hosting and attending social gatherings (Nesbit 1973: 84). Officers from Fort Crawford including Zachary Taylor, afterward president of the United States, and Jefferson Davis, who later became president of the Confederacy, are known to have attended dances held at the "Old Stone House", a large two-story stone hotel formerly located in the town of Sinipee about 40 miles south of Prairie du Chien on the Wisconsin side of the river and within the Study Area (Roethe 1927; Kanetzke 1961: 7; Stark 1977: 10; Riege n.d.: 3; Stanton n.d.).

The relationship between a military fort and the community which developed around or near it was an intimate one, although the two did not always share the same social or economic goals. This was particularly true as the first influx of Euro-American settlers began arriving in the Upper Mississippi valley during the 1820's.

9.4.3 Lead Mining

During the 1820's there appeared on the frontier a new class of American settler - the pioneer lead miner. Spurred

by published newspaper accounts and notices in the papers of St. Louis and elsewhere concerning the wealth of the lead mines of the Upper Mississippi, thousands of miners came to the region with the hope of striking it rich in the lead veins of southwestern Wisconsin, northwestern Illinois, and northeastern Iowa. The lead deposits of the Upper Mississippi region had been known for some time and had come to the attention of the French during the mid-seventeenth century. Although the French knew of the lead mines as early as 1658, lead from the region was mined and used by prehistoric Indians. Galena has been found at Early Archaic-Contact Period sites throughout the Mississippi and Ohio river valleys and the Great Lakes region (Walthall '981).

The French fur trader, Nicolas Perrot, was the first European to actively engage in trading lead, mined and smelted by the Indians in the region. In about 1690, Perrot established a trading post below the mouth of the Wisconsin River, presumably in the vicinity of Dubuque, Iowa among the Miami who mined lead on both sides of the river (Kellogg 1925).

From Perrot's time throughout the entire French period, the lead mines continued to be worked by both Indians and voyageurs who used the product to supplement the fur trade. Following the withdrawal of the French from the Northwest in 1763, Indians such as the Sac, Fox, and Miami guarded the secret of the lead mines carefully, revealing their sites to only favored traders such as Julien Dubuque who came to the region in 1788. After settling near the mouth of Catfish Creek, Dubuque obtained a Spanish grant to approximately 140,000 acres, with the privilege of mining. After Dubuque's death in 1810 the Fox burned his house and buildings, revoked his grant, and banned Euro-Americans from their lands (Walthall 1981: 19).

The Upper Mississippi lead mines, however, continued to attract the interest of government explorers and speculators. In 1820 Dubuque's former mines were visited by Henry Rowe Schoolcraft who recorded and later published his observations (Schoolcraft 1821, 1834). By this time increasing numbers of American miners had begun to work the lead mines in and around Galena. Their desire for new mines eventually led to the removal of the Sac, Fox, and Winnebago and their land cessions, combined with the spreading news of the riches of the lead district, gave impetus to a great influx of Southerners, Yankees, and foreign-born, mainly Cornish and some Irish, into the region. The penetration of the lead miners into the hollows, prairies, and hinterlands of the frontier laid the foundations of a new pattern of Euro-American settlement that was to last well into the late nineteenth century.

The principal centers of the Upper Mississippi lead district were located immediately south and east of the Study Area: Galena on the Fever (Galena) River about four miles from the Mississippi River in Illinois, Dubuque near

the mouth of Catfish Creek on the west side of the river in Iowa, and Mineral Point in the heartland of the Wisconsin diggings. Between the years 1822 and 1860 hundreds of miners came to these boom towns to lay in supplies before heading for the lead mines.

Many of the hollows and bluffs located along the Mississippi River within the Study Area contained lead deposits and became the focus of concentrated mining activity. By 1858 lead ore had been discovered and smelters established at Snake Hollow (Potosi), Cassville, Sinipee, Prairie la Porte (Guttenberg), North Buena Vista, and Peru. By 1840 there were at least eight smelters operating in and around Potosi (Baumann 1939: 46).

The arrival of lead miners in the region brought rapid economic development. Small towns such as Potosi, Van Buren, LaFayette, Osceola, Sinipee, Peru, and North Buena Vista grew where miners settled and farming began around the mines to provide basic foodstuffs for the mining population and to diminish the need for outside supplies (Nesbit 1973: 115). By 1845 the population of Potosi, for example, had increased to 1,300, making it the largest town in the western part of Wisconsin, the principal port of Grant County, and the most feared rival of Galena and Dubuque, both of which employed runners to divert trade from there (Baumann 1939: 46).

The lead mining period also witnessed some of the most ingenious schemes to transport lead to markets by way of proposed canals, waterways, roads, and railroads. Many of these promotions, however, never materialized. Easy access to markets continued to be a primary concern among mining communities - many of which began agitating for improved navigation on the Mississippi and along some of its tributaries so that lead could be shipped more efficiently and economically down river to St. Louis and New Orleans, and up the Ohio to eastern markets. The failure of a canal-building enterprise to improve the harbor for steamboat navigation at Potosi during the 1840's was a leading factor which caused the town to lose its shipping industry and position as the leading riverport on the Upper Mississippi River.

The depletion of many of the region's lead mines, a scarcity of manpower caused by the feverish California gold rush of the late 1840's, and an eventual decline in the price of lead following the Panic of 1857 brought an end to mining on a large-scale in the Upper Mississippi Valley. After 1860 the nature of lead mining changed dramatically. Though some lead mining continued, post-Civil War efforts focused on different minerals, primarily zinc, and used more capital intensive mining techniques. A resurgence of mining activity occurred in some areas such as Guttenberg and North Buena Vista around the turn of the century but was short-lived. Active mining operations in the Upper Mississippi lead-zinc district, however, continued until 1979 when the

last operating underground metal mines in Wisconsin were closed (Hill and Evans 1980: 13).

The lead mining region contains some of the earliest residences and commercial buildings in the Upper Midwest. In Wisconsin many of these are being identified and recorded for the first time as part of an intensive architectural and historic survey of early nineteenth century lead mining communities in Grant and Lafayette Counties (Rausch et al. 1983; Taylor, in press). Several attempts have been made to preserve lead mining era resources in the region. These include: 1) the restoration of downtown Galena, Illinois; 2) the restoration of several Cornish miners' residences (c. 1840's) at Pendarvis and downtown commercial buildings in Mineral Point; 3) the restoration of the Dubuque Shot Tower; and 4) the development of the St. John Mine at Potosi into a museum and tourist attraction. Many of these buildings and sites are listed on the National Register of Historic Places.

Lead mining-related resources in the region have only begun to be explored through archaeology. Notable examples include archaeological surface surveys of Gratiot's Grove in Lafayette County (Palmer n.d.) and at the abandoned town sites of Paris (c. 1828-1848) and Gibraltar (c. 1827-1834) in Grant County (Geier 1975). Archaeological salvage work has also been conducted at the site of Hard Scrabble (c. 1820's) near Hazel Green, Wisconsin (Fay 1984). Further archaeological, architectural, historical, and archival research relating to the lead industry in the tri-state region of Wisconsin, Illinois, and, Iowa, particularly in rural areas, is needed.

9.4.4 Early Settlement, Organization, and Statehood

The influx of lead miners and farmers into the Upper Mississippi valley during the 1820's, 1830's, and 1840's led to the accelerated cession of lands by various Native American groups in Wisconsin and undoubtedly contributed to the outbreak of the Winnebago War of 1827 and Black Hawk War of 1832 (Wilgus 1927: 403). The suppression of these outbreaks of Indian hostility, however justified, by the military and militia opened up the lead region and the Upper Mississippi to increased Euro-American settlement. Interest in Wisconsin land was so great immediately following the Black Hawk War, for example, that land offices were opened in 1834 at Mineral Point and Green Bay for the auction of newly surveyed lands (Nesbit 1973: 112).

This pattern of settlement was repeated across the river in Iowa following the cession of Sac and Fox lands by the Treaty of Rock Island in 1832 and the removal of the Winnebago from the Neutral Grounds by 1848. By 1838 a land office had also been established at Dubuque.

As government surveyors, land speculators, farmers and entrepreneurs poured into the Upper Mississippi valley by way of various land and water routes, the need to organize

the region into territories for civil, political, and judicial purposes, as set forth in the Northwest Ordinance of 1787, was realized. The desire for territorial status, however, was far from universal, especially among fur traders in the region who saw no advantage to further government regulations and the removal of Indians to western lands across the Mississippi.

Under the personal and political influence of men like Henry Dodge and James Doty in Wisconsin and Robert Lucas in Iowa, territorial governments were formed in the region as the number of settlers in these areas increased. The Wisconsin Territory, as formed in 1836 from Michigan Territory, included both present-day Iowa and Minnesota. The organization of Iowa Territory followed in 1838, with Iowa statehood in 1846. Wisconsin attained statehood in 1848.

Many towns and villages in the lead region had hopes of being selected as the site of the capital for the Territory of Wisconsin in 1836. Communities such as Cassville, Dubuque, and Peru located adjacent to Navigation Pool 11 competed with several other places in the area for the coveted title of territorial capital (Draper 1872: 364; Salter 1892: 305; Thwaites 1908: 241). The promoters of the town of Cassville even went so far as to erect a large brick hotel along the riverfront to accommodate the legislators. When the territorial legislature selected Madison, their dreams ended in bankruptcy. Although Cassville and Dubuque continued to flourish and prosper by virtue of their river locations, the town of Peru, in contrast, became a ghost town following a cholera epidemic in the 1840's.

The establishment of indivdual counties bordering the Mississippi River within the Study Area is shown in Table 25. The works of the territorial, county, and early state governments was largely concerned with plans to settle and develop the land and exploit its natural resources.

9.4.5 Immigration and Settlement

The westward movement of settlers and immigrants across the United States during the 1850's and 1860's brought a continuous stream of new arrivals into the Upper Mississippi valley. Between 1850 and 1860, for example, the population in Iowa increased by over 257 percent, while the population in neighboring Minnesota skyrocketed by over 2730 percent (Clark 1914: 213).

The rush of settlers into the region was facilitated by the completion of railroad lines to several points along the Mississippi River, promotional schemes of land companies and speculators, and by advertisements published in eastern and foreign newspapers which contained glowing accounts of the beauty and advantages of living in the Upper Midwest. Those fortunate to own homes in Wisconsin and Iowa also wrote enthusiastic letters to their relatives and former neighbors urging them to come and share in their prosperity (Clark 1914: 215).

TABLE 26

ESTABLISHMENT OF INDIVIDUAL COUNTIES
BORDERING THE POOL 11 STUDY AREA

County	Year Established	Present Boundaries Established	County Seat
Wisconsin			
Grant	1836	1836	Lancaster
Iowa			
Clayton	1837	1837	Prairie la Porte (Guttenberg) 1837-1843
			Jacksonville (Garnavillo) 1843-1856
			Elkader 1856 to present
Dubuque	1834	1837	Dubuque

Foreign emigration to the Upper Mississippi valley was particularly heavy during the years 1850-1890. Aggressive and well-planned efforts were implemented by the states of Wisconsin and Iowa to draw immigrant groups, particularly from Germany, Norway, and Sweden (Gregory 1909: Hansen 1921). The state of Wisconsin officially began the movement by establishing an Office of Emigration in New York City in 1852 (Blegen 1919: 4). Similar offices were established by Iowa in 1860 as well as Minnesota in 1864. Competition among the state agencies was strong and was particularly spirited among railroad and steamboat agents. Numerous pamphlets, guides, and pocket maps were published during these years to lure immigrants and settlers to the region (Peck 1837, Plumbe 1839, Newhall 1846, Curtis 1852, Colton 1854, Dubuque Emigrant Association 1858, Lapham 1867).

Several immigrant-aid societies and claim associations were also organized to bring settlers into the region. Hundreds of German immigrants, for example, came to Guttenberg, Iowa in the years following 1845 under the auspices of the Western Settlement Society of Cincinnati. In 1854 several German and Luxembergian immigrants arrived in the mineral region at Potosi following a harvest failure in Europe (Levi 1898: 378).

The imprint of foreign emigration in the Upper Mississippi valley remains today. Many cities, towns, and coun-

The erection of military forts and trading posts at various points along the river required a gradual increase in the number of visits made by steamboats which brought in troops and supplies. Steamboats under government charter continued to make annual trips to Fort Snelling up to 1842 only because there were no boats on the river above Galena and Cassville which were independently engaged in the steamboat river trade (Merrick and Tibbals 1911: 110).

The era of steamboating on the Upper Mississippi which followed the voyage of the Virginia witnessed many stages of development - each with its own history. For sake of convenience, the six distinct periods established by the noted steamboat historian, William J. Petersen (1946: 293-295), are employed, with some modifications, to present a thematic history of Upper Mississippi steamboating.

1) The lead period, 1828-1848.
The lead mines furnished an important downstream cargo to the steamboats which brought most of the supplies for the rapidly increasing mining populations at Galena, Dubuque, Peru, Sinipee, Potosi, North Buena Vista, and Guttenberg. Petersen (1946: 293) states that more than 472 million pounds of lead valued at over $14 million were shipped down river by Mississippi steamboats during this period.

2) Immigration and settlement, 1849-1870.
The impetus given by the opening of Indian lands to Euro-American settlement and the rise of lumbering on the Black, Chippewa, and St. Croix Rivers caused a rapid growth in steamboat traffic above the mouth of the Wisconsin River. Hundreds of settlers, both native and foreign born, arrived in the region by steamboat. The period of the 1850's, in particular, witnessed a rush of settlers into the region.

A unique manifestation of the 1840's and 1850's was the development of the "fashionable" or "grand" tours, which were luxury trips by steamboat on the Mississippi River. Wile short excursions were common, the most popular on the Upper Mississippi were the excursions from St. Louis, New Orleans, Pittsburg, and elsewhere to Rock Island, Galena, Dubuque, Prairie du Chien, Lake Pepin, St. Peters, and the Falls of St. Anthony (Blegen 1939: 379).

Perhaps the most famous of the fashionable tours was one organized in 1854 by the owners of the Rock Island Railroad to celebrate the completion of the railroad to the Mississippi River (Petersen 1934, Blegen 1939, McDermott 1941, Babcock 1954).

Part of the festivities included the chartering of seven steamboats to carry 1,200 invited guests from Rock Island to St. Paul. Among the guests on board were ex-President Millard Fillmore, accompanied by his daughter, and several prominent politicians, distinguished academicians, and noted journalists of the day. The trip was enlivened by receptions, music, and dancing.

News of this event spread among Easterners and Southerners by participants, who told their friends of the natural beauty of the scenery and the hospitality of the river townspeople along the way, and through published accounts in newspapers and magazines. Many took their friends' advice and came to the Upper Mississippi by steamboat during the years before the Civil War.

3) The grain period, 1860-1890.
During these active years on the river, large shipments of grain were transported downriver by steamboats. The Diamond Jo line of steamboats was established specifically for carrying heavy cargoes of grain southward. In 1861 three million bushels of wheat passed through McGregor located just north of Pool 11 (Quigley 1931: 29).

4) Period of decline, 1890-1910.
The building of the railroads along the river drastically reduced the volume of steamboat river trade. Many steamboat operations, in fact, virtually disappeared from the river. Brown (1919: 424) cites other reasons for the collapse of steamboating. These include: a) the unusually short life span of a steamboat, which on the Upper Mississippi between 1823 and 1863 averaged only five years, due to fires, boiler explosions, and snags in the river; b) the irregularity of service; c) the instability of steamboat rates which sometimes fluctuated by as much as 1000 percent; d) a poor understanding of economic principles in boat operations; and e) the lack of a good line organization, especially properly constructed terminals for handling freight and passengers.

5) Period of excursion boats, 1910-1927.
During these years steamboats reappeared on the river carrying tourists on pleasure trips up and down the river, reminiscent of the "fashionable tours" of earlier generations. Only one excursion steamboat line was based on the Mississippi River-the family-operated Streckfus line which began in 1911 in Rock Island, Illinois with the purchase of

the last four remaining packets of the Diamond Jo Line (Meyer 1967).

6) Towboat era, 1927-present.
This period was ushered in by the establishment of the Federal Barge line service in 1927 and the nine-foot commercial navigation channel that resulted from the completion of the 26 locks and dams constructed on the river during the 1930's by the U.S. Army Corps of Engineers.

The era of steamboating on the Upper Mississippi is a colorful chapter of river history. Many old steamboat captains and river pilots have recalled their life experiences in written form (Glazier 1887, Gould 1889, McMaster 1893, Merrick 1909, Merrick and Tibbals 1911). The glamour and spirit of the "good old river days" has also been recaptured and preserved in the works by modern historians (Shippee 1920, Babcock 1926, Petersen 1937, Lass 1962, Rosean 1969).

A recent thematic survey of river transportation in Iowa shows that few vestiges of the steamboat era remain along the river between Dubuque and Guttenberg. Resource types include the levees at Dubuque and Guttenberg which still remain although in a somewhat modified condition, three stone grain warehouses built in the 1840's along the riverfront at Guttenberg, and five submerged steamboat wrecks dating from 1854-1872 (Division of Historic Preservation, Iowa State Historical Department 1976: 32-33, 58). No comprehensive thematic inventory of properties associated with the era of steamboat navigation in Wisconsin has been compiled, although the sites of several former river landings are known to exist (Abel 1839, Harthill 1859, Edwards, Greenough & Deved 1866).

9.4.9 The Coming of The Railroad

A new era began in the Upper Mississippi valley in the late 1850's and 1860's with the arrival of the railroad. Spurred by intense rivalries, promotional schemes, and generous land grants from state legislatures, the railroads pushed ever westward in their quest to freeze out the steamboats from the profitable grain trade.

During the 1850's the railroad reached the Mississippi River at several points in Illinois and Wisconsin, arriving at Rock Island in 1854, Dunleith (East Dubuque) in 1855, Galena in 1856, Prairie du Chien in 1857, and La Crosse in 1858. Additional routes and connecting lines were built through the interiors of these states.

Railroad construction in Iowa and Minnesota during this period was equally frantic. The first tracks in Minnesota were laid between St. Paul and St. Anthony in 1862 (Crooks 1905: 448). By 1872 the railroad from St. Paul had been extended southward as far as La Crescent (Derleth 1948: 289). A second line was built southward from Minneapolis into Iowa

between 1865 and 1870 (Prosser 1966: 12). By 1870 the rail lines in central Iowa and Minnesota were linked, and for the first time it was possible to travel all the way from Minneapolis to Chicago and Milwaukee by rail (Prosser 1966: 12).

Railroad construction in Iowa and Wisconsin also proceeded along the Mississippi River. Building northward from Dubuque, the Chicago Dubuque & Minnesota railroad reached Guttenberg and McGregor in 1871 (Donovan 1964: 198, 223). The "river route" along the west bank of the river was completed in 1876 when the line from La Crescent, Minnesota was extended southward as far as McGregor. The line paralleling the east bank of the river from the Illinois border to Prescott, Wisconsin was completed in 1886 by the Chicago, Burlington & Quincy Railway Company in 1886 (Raney 1936: 402).

Several early branch lines were built westward from the river towns in Iowa and Minnesota to haul grain, agricultural products, and other commodities to market. The Dubuque & Turkey River Railroad, for example, was built westward from Turkey River Junction between 1871-1878 and later became the Volga Branch of the Chicago, Milwaukee & St. Paul Railway Company (Inter-State Publishing company 1882: 624, 1009, Price 1916: 112-113).

The first railroad bridge to span the Mississippi River in the area was completed at Dubuque in 1868. No railroad or highway bridges across the Mississippi River were ever built between Wisconsin and Iowa within the Pool 11 limits.

Prior to the construction of the railroad bridge at Dubuque, railroads had crossed the Mississippi River at points such as Prairie du Chien, La Crosse, and Winona by barges which were established to shuttle railroad cars back and forth across the river. During the winter months tracks were laid across the frozen Mississippi River. The construction of draw bridges across the river was a constant source of aggravation to steamboat captains and river pilots.

While many railroad companies were granted charters in both Wisconsin and Iowa, few actually constructed any trackage. The Potosi & Dodgeville Railway Company, for example, was organized as early as 1851 but never succeeded in laying any track between the two towns named in the charter (Meyer 1898). The same was true of the Belmont & Dubuque railroad and several others like it granted government charters during the early period of railroad expansion in the region.

The region's most ambitious railroad scheme was John Plumbe's plan to build a transcontinental railroad stretching from New York to San Francisco via Milwaukee and Sinipee in 1837, ten years before Wisconsin's first railroad was chartered. The project failed when the boom town of Sinipee was wiped out by a malaria (cholera?) epidemic in the spring of 1839 (Kanetzke 1961: 7; Stark 1977: 12).

As railroads replaced steamboats as the dominant mode of transportation in the Upper Mississippi valley during the 1870's, they quickly began to shape urban and rural life,

providing new opportunities and orientations for the region's inhabitants. In the process of expansion towns sprang up along the railroad tracks and several local shipping and mailing points were established. The stations at Edmore, Zollicoffer Lake, Waupeton, Cameron, Rutledge Siding, Blake, Potosi Station, and McCartney located within the study area are a few examples of the hundreds of small freight and passenger depots established across Iowa and Wisconsin over the years.

While the arrival and expansion of the railroad spelled economic doom and disaster for many river towns, it brought new economic prosperity to others. Towns such as Davenport, Dubuque, Marquette, Prairie du Chien, La Crosse, Winona, St. Paul, and Minneapolis, in particular, all profited from being a part of the rail network. In 1871 the Chicago, Milwaukee & St. Paul Railway Company established what became known as the "Milwaukee shops" at Dubuque. This remained the largest single industry in the city for many years (Datisman 1969: 13).

Railroads operating in the Upper Mississippi valley today continue to play an important role in the economic development of the region. The roar of north and south bound trains carrying grain, coal, and other commodities along both sides of the river has become a common feature of the cultural landscape. As the number of commercial river barges on the Mississippi river intensifies, however, the role of the railroads and the river will need to be further analyzed and, possibly, redefined.

Few vestiges of railroading remain today. Many of the freight and passenger stations established along the lines paralleling the river had been abandoned during the 1930's, victims of the depression, the motor truck, and over expansion (Donovan 1964: 223). Many of the rails along this route have been removed.

9.4.10 Lumbering

Many of the settlers who arrived in the Upper Mississippi valley by steamboat and rail between 1830 and 1910 came to work in the magnificent white pine forests of northern Wisconsin and Minnesota. The region contained not only a seemingly "endless" supply of timber, but also sufficient waterways for floating logs to sawmills and market places.

The major tributaries of the Upper Mississippi divided the region into natural lumbering districts before railroads became important. Logging activities were focused primarily along the Rum, Black, Chippewa, St. Croix, and Wisconsin Rivers. During the spring drives, millions of board feet of logs were floated downstream to sawmills.

Rafting on the Upper Mississippi and its tributaries began in the 1830s, reaching a peak of activity during the early 1890s. Rafts consisted of cut logs as well as sawed lumber. Both types of rafts floated downriver as far as St. Louis for distribution to the rapidly growing settlements on

the treeless prairies of Illinois and the plains west of the Mississippi (Raney 1935: 80; Fries 1942: 23). After the Civil War rafts were pushed or towed downriver by steam tug.

The largest log raft on the Mississippi was assembled at Lynxville in 1896. It was 1550 feet long and 260 feet wide, and contained over 2 million board feet of lumber. The largest lumber raft on the Mississippi originated on Lake St. Croix in 1901. Although smaller in size, 1430 feet long and 285 feet wide, it contained over nine million board feet of lumber - the equivalent load of 900 railroad cars (Fremling 1974: 25). The last raft of lumber on the Upper Mississippi River was floated in 1915.

The floating of huge numbers of logs downriver required extensive works to catch, sort, scale, and store logs. The largest and most famous of these sorting works was constructed at the mouth of the Chippewa River by the Beef Slough Manufacturing, Booming, Log Driving, and Transportation Company. Between 1867 and 1890 over five billion board feet of logs were rafted out of Beef Slough booms (Curtiss-Wedge 1919: 54; Anderson-Sannes 1980: 187).

As lumbering and rafting expanded, sawmills were built in virtually every town along the Upper Mississippi River and its tributaries. In Pool 11 sawmilling operations developed at Dubuque, Guttenberg, Millville, Cassville, Potosi, and Sinipee, although not to the extent that they did at other river towns such as Winona, La Crosse, Davenport and Clinton. The sawmills in the region employed hundreds of laborers and stimulated the growth of many secondary businesses such as barrel-making, lath and shingle mills, furniture, sash, and moulding works, boat works, and hardware stores. Several other non-lumber businesses were established to provide services and supplies for the lumber trade.

The tremendous amounts of lumber sawed during these years was staggering. Between 1880 and 1890, for example, the sawmills in the city of La Crosse alone cut nearly 1 million board feet of lumber annually (Miller 1959: 7). In 1885 sawmills in the river counties in eastern Iowa cut over 97 percent of the total amount of lumber sawed in the entire state (Belthius 1948: 141).

Between 1900 and 1910, with the decline of the logging industry, many companies sold their land holdings and mills and moved west to exploit the Douglas fir and pine forests of the Pacific Northwest. Although some sawmills along the river remained open by converting to hardwood sawmill work, most sawmilling operations closed.

The departure of the lumbermen and lumberjacks from the region caused many river towns such as Read's Landing, Minnesota and North Alma, Wisconsin to diminish in size and importance. River towns such as Winona, La Crosse, and Dubuque, which had developed diversified manufacturing economies, were better able to withstand the decline of the lumber industry.

Much of the legacy of the logging era is preserved in the early county histories as well as in the personal reminiscences of raft pilots (Russell 1928; Blair 1930; Turner 1939, 1940) and lumberjacks (Vinette 1926; Crosby 1937). The story of lumbering in the region is also traced by modern historians (Belthus 1948; Larson: Fries 1951, Hidy, Hill, and Nevins 1963, Kohlmeyer 1972).

9.4.11 Clamming and The Pearl Button Industry

As lumber manufacturing in the towns along the Upper Mississippi River was gradually slowing due to the diminishing supply of timber in the 1890s, a new commercial enterprise - the pearl button industry - was just beginning to take form. The use of mussel shells from the Upper Mississippi River for the making of freshwater pearl buttons begins with J.F. Boepple, a German immigrant, who launched the first button factory in 1891 in Muscatine, Iowa (Carlander 1954: 49, Tempte 1968: 3-5). By 1902, as the mussel beds in the Muscatine area became exhausted, clamming operations were extended southward into Missouri and northward into Minnesota and Wisconsin (Carlander 1954: 41). Productive mussel beds in Pool 11 that were exploited include those at Guttenberg, although others were located as far north as St. Paul (Tempte 1968: 7).

As interest in clamming and the button industry spread, hundreds of clammers drifted the river in their scows during the catch season, harvesting several species of clams. Tent cities of clam fishermen sprang up along the banks of the Mississippi River during the summer months, particularly around Lansing, McGregor, Harpers Ferry, and Prairie du Chien.

Although there were several different methods of gathering clams, the most common was the use of "crowfoot" bars pulled by a small, flat-bottomed "john boat". During the winter months, when the ice on the river became thick enough, clamming was often done through the ice with "shoulder" and "scissor" rakes (Carlander 1954: 42).

Once the clams were raked from the river bottom they were brought to shore and "boiled out" in crude, oblong tanks placed at convenient places on the islands or on shore, so as to separate the shell from the clam meat. The clam meat was often sold as bait to commercial fishermen or as feed to poultry and hog farmers.

Thousands of tons of mussel shells gathered by the clammers were sold to local button factories or shipped downriver to other concerns where they were cut into button "blanks", then drilled, and polished. Hundreds of men and women were hired by the button companies to grade, cut, and box the finished shell buttons for shipment by rail or barge to markets across the country.

Button factories and "saw works" were established in several river towns throughout the Upper Mississippi region during the late 1890's and early 1900's, particularly along

the river in what is now Pool 10 and the extreme northern part of Pool 11. Prairie du Chien, for example, had one large button factory, the Chalmers Button Factory, and several small one and two-man cutting operations (Tempte 1972: 31). In Lansing, Iowa three button works were built, the Turner Button works, the Capoli Button Works, and the New Jersey Button Works (Hancock 1913: 466-467). The H. Chalmer Pearl Button Company was the first of three such plants established in Guttenberg (Jacobsen 1979: 3). Many tons of mussel shells from the area were also hauled down-river by barge to Iowa button factories in Clinton, Daven-port, and Muscatine.

In addition to the market for shells, there was also a considerable trade in freshwater pearls. Most of the pearls were found while boiling out the shells that were to be sold to the button factories. Although freshwater pearls were considered inferior to saltwater pearls, individual pearls often sold for several hundred dollars, and some eventually were sent to England to become part of the crown jewel collection (Peacock 1958).

The center of pearl buying in the upper Mississippi region was at Prairie du Chien. During the heyday of clam-ming operations there were 27 pearl buyers registered in the city, people from India, France, England, and various parts of the United States (Tempte 1968: 17). There was such great competition among the pearl buyers for the finest gems that each dealer had agents along the river to provide infor-mation on those that were found. Stories of midnight deal-ings and overnight fortunes from this period are common.

Commercial river clamming, button cutting, and the buying and selling of freshwater pearls played an important role in the economy of the region for nearly three decades. During the 1930s and 1940s, however, the advent of cheaper plastic buttons and dwindling supplies of mussels finally brought a halt to the pearl button industry. For the next two decades the only reminders of this once-thriving industry were the crumbling piles of shells along the river's banks.

During the late 1960s a sudden revival of clamming on the Upper Mississippi River was caused by the Japanese cultured pearl industry which created a new market for dried mussel shells. The Japanese used the freshwater mussel shells for processing into round pellets which were then inserted into saltwater oysters for producing pearls (Finke 1966: 27). Unlike previous clamming practices, only the larger shells of just a few species were bought for this purpose (Mathiak 1979: 7). Thousands of tons of clam shells were taken from the river towns during these years.

It is not likely that commercial mussel fishing in the Upper Mississippi River will ever return to the major proportions that it did at the turn of the century. The navigation locks and dams built by the U.S. Army Corps of Engineers during the 1930's have slowed down the river current and silt deposits have smothered many formerly

productive beds. Pollution in the river has also damaged many of the mussels which are sensitive to changes in water quality. Nevertheless, clamming still remains an important source of income for many residents along the river.

Remaining resource types from the commercial mussel fishing era in the Pool 11 area include several large stone buildings which formerly housed button factories and saw works discarded along the river. Other types of resources including historic clamming stations have been identified during these investigations.

9.4.12 The Upper Mississippi River: An Epilogue

During the past 300 years of recorded history, man's relationship with the Upper Mississippi River has changed from one of a traveler on its meandering waterways to a controller of its ebb and flow. The development of this relationship can be summarized in four stages:

1) 1673-1820, The Wilderness River.
For nearly two centuries following the discovery of the Upper Mississippi River by Marquette and Joliet in 1673, the river and its tributaries served as water highways carrying fur traders, explorers, lead miners, and settlers into the region. The Mississippi River also fostered the early settlement of the region.

2) 1820-1870, The Improved River.
During this stage, the first attempts were made to improve the Upper Mississippi River for steamboat navigation. Snags, rocks, fallen trees, and sand bars were cleared from areas in the river which obstructed river traffic and made navigation hazardous.

3) 1870-1930, The Altered River.
This state was marked by intensified river improvements and began in 1870 with the clearing of the rapids at Davenport and Keokuk, Iowa. Further alterations of the river's natural course followed the authorization of a four and one half-foot channel in 1878 and a six-foot channel in 1907. These navigation channels were accomplished by snag and sand bar removal, the construction of wing dams and shoreline protection devices, and by maintenance dredging.

4) 1930 to date, The Controlled River.
The passage of the Rivers and Harbors Act of 1930, which authorized the construction of a nine-foot channel on the Upper Mississippi River through the creation of a series of locks and dams, added a new dimension to man's relationship with the

Mississippi River. The dams and the impoundments of water behind them affected the function of many river towns and changed the face of the natural and cultural landscape. The impact of man on the ecology and archaeology of the Upper Mississippi River Valley is well documented (Claflin 1972; Fremling 1974; Gramman 1982).

Today the Upper Mississippi River no longer is a free flowing river. Since the 1930s the Mississippi has been transformed from a natural meandering waterway in the wilderness into a channelized canal carrying steel barges through the economic heartland of America. The future history of the region will undoubtedly be the future history of the river. Its destiny no longer belongs to those who shaped its past.

10. PREDICTIVE MODEL-SURFICIAL GEOLOGY AND ARCHAEOLOGY:

As previously noted, this model has two elements; (1) surficial geology; and (2) archaeological site distributions. The first element provides a reconstruction of the stratigraphic units of the floodplain in their relationship to present topography. Baseline dates are indicated where known for buried surfaces within these valley cross-sections. The discussion presents attempts to demonstrate variations in depth and composition of sediments in the floodplain. The second element identifies archaeological sites known to be buried within the major stratigraphic units and their relative position to one another, and, to current topography. The nature of time-depth relationships is explored, and, together, these conclusions serve as the basis for predicting where buried archaeological sites can be expected to occur. The purpose of the model is to serve as a guide to future investigations on the lowland floodplain of Navigation Pool 11. Included in this discussion is a review of appropriate methods and techniques for site survey in deep alluvial environments.

10.1 Methods and Techniques of Archaeological Survey in Alluvial Environments:

Recent investigations in alluvial environments in the Upper Mississippi valley have demonstrated that traditional methods and techniques of archaeological survey such as surface collection, shovel probing, and test pit excavation are inadequate for comprehensive sampling (Boszhardt and Overstreet 1982, Overstreet 1983, 1984, Church 1984). Appropriate aged surfaces, those that can be predicted to harbor archaeological sites, are often beyond the reach of these methods as normally applied. In most instances the full depth of the Holocene matrix cannot be investigated unless

additional techniques are used as an adjunct to traditional methods. These include coring and auger investigations, often supplemented by analyses of physical and chemical properties of sediments and ground-based remote sensing utilizing such techniques as ground-penetrating radar, seismic refraction, and perhaps other techniques such as resistivity and cross-hole sonar. Applications and limitations are noted below.

10.1.1 Coring and Auger Investigations:

During the course of these investigations two primary techniques to sample sub-surface sediments were applied. Silt probes (Oakfield tools) were effective for sampling the nature of fine-grained sediments to depths of approximately 15-20 feet below the surface. Silt probes can be utilized more rapidly than bucket augers (the second technique) in appropriate sediments. A second advantage is that the samples are retrieved generally intact. This allows for a more efficient appraisal of the nature of the contact between sediments of differing textures, colors, and other characteristics. As well, silt probes provide for better vertical control.

The process of core extraction and recording is time consuming. As much as one-half man day can be expended to extract and adequately describe a single sample dependent on the depth. Extensions of 3' lengths rather than standard 1.5' lengths assist in decreasing set-up and take down time for the tools. The major limitation is the very small sample size. In addition, the probability of recovering cultural materials in a one" silt probe is certainly remote, although this has occurred in instances of dense concentrations of such material. Shell middens, fragments of burned rough rock, and waste flakes have been retrieved in silt probes from depths of as much as 15' below the surface. Another limitation related to the use of silt probes is bit refusal. When a large object is encountered such as rock or, more often, buried wood, the core has to be abandoned and re-started in another location. Driving the silt probe with a rubber mallet is sometimes successful in penetrating durable materials or compacted sediments.

Bucket augers have two major advantages in that they will more readily penetrate coarse sediments than silt probes and the size of the sample is geometrically increased. Our applications utilized a 3" diameter bucket auger, however, both larger and smaller sized apparatus are available. Given the increase in sample size, the likelihood of recovering cultural materials is increased.

There are also several disadvantages associated with the use of bucket augers. First, the vertical increments are smaller than those of silt probes. This means that the number of extractions of samples is increased for a given bore-hole. Second, the weight of the implement and the 3/4" pipe is substantial. Removing 15 or more feet of pipe from

a saturated hole is no mean feat. It may be necessary in some situations to use a portable well-puller or other device to extract the tool from the matrix. A third disadvantage is that the auger does not remove the sample intact. Rather, the sample is mixed as it is wormed up into the sample tube. This may serve to obscure the nature of contact between differing sediments. Thus, it is most effective whenever possible to use the implements in tandem. Field and lab procedures for examination of the physical and chemical properties of sediments have been previously summarized, but are reviewed and discussed here owing to the critical implications for site survey.

10.1.2 Post Settlement Alluvium-Genesis and Character:

10.1.2.1 Historical perspective:

The phenomenon of post settlement alluvium in the upper Mississippi valley is a result of European settlement and subsequent land use. Destruction of the natural vegetation cover has accelerated surface runoff. Stripping the highly mobile organic rich surface horizon and exposing less permeable subsurface horizons aggravated the problem. The first major impact upon the landscape began with intensive exploitation of lead. Later, as lead reserves became exhausted, agriculture became a key factor in mobilizing sediment from the uplands.

In 1673 Joliet and Marquette began exploration of the Upper Mississippi Valley and by 1690 Perrot had built a fort on the east side of the Mississippi River across from present day Dubuque. Although the primary purpose for the fort was fur trading, Perrot was credited with the discovery of the lead mines. Perrot's mines, as they were called, were worked by the Native Americans and by white voyageurs who used the lead to supplement the fur trade (Trewartha, 1938). In 1699 LeSueur received permission from the French government to conduct an expedition with the assistance of 30 miners to the Upper Mississippi valley in order to mine the lead ore. An assistant of LeSueur noted the operation of a lead mine a league and half up the Fever (Galena) River.

Mining operations proceeded slowly and by 1743 about 18 to 20 mines were producing along the Fever River (Bain, 1906). In 1767 numerous traders with Spanish licences were coming upstream from Louisiana and conducting operations on the western side of the river and practically all of the lead cargo was moved by the Spanish down the Mississippi (Trewartha, 1940). By 1780 extensive lead mines had been discovered and mining rights were granted by the Fox to Julien Dubuque. Dubuque built furnaces and worked the mines until his death in 1809. The lead sulphide mineral was extracted mostly by the Indian community by means of a hoe, shovel, crowbar, or pick (Schoolcraft, 1821). After

Dubuque's death the Fox Indians seized the mines and continued to operate them until 1832 (Hall and Whitney, 1862).

The 1820's was a time when many white settlers came to the area and located along the Fever River. During July 1825 the Fever River diggings consisted of 100 miners, but by June 1826 406 miners laid claim to the mineral resources of the area (Thwaites, 1895). At the close of the Black Hawk War in 1832, large tracts of land were ceded to the U.S. government by the Sac and Fox Indians. In June 1833 the Treaty went into effect enabling a flood of settlers to take possession of the land (Bain, 1906). Lead production dramatically increased, and peak production was reached in 1847, totalling 54 million pounds that year. Then production began to decline with the discovery of gold in California. Prospectors fled to the west reducing the total labor force by one third (Daniels, Percival, and Hall, 1854). In addition, most of the lead ore extracted from the surface pits had been exhausted.

The era of the pioneer lead mining came to a close at the beginning of the American Civil War. Up until the War zinc sulphide was discarded and considered useless. After 1860, zinc production became important and processing was begun by a few mining companies. Zinc mining became big business and production reached a peak during W.W.I. At the End of W.W.I. production declined, but was again revived during W.W.II. The end of the War brought a virtual close to mining operations in southwestern Wisconsin. Meanwhile, the pioneer lead miners of earlier years shifted their occupations to farming (Schafer, 1932).

The Big Platte watershed, a tributary to the Mississippi river, had undergone significant changes as a result of agricultural land use (Knox, 1977). By the 1850's much of the watershed was put under wheat cultivation. As the humus-rich surface horizons were stripped reducing the infiltration capacities of the soil, surface runoff and erosion increased and stream siltation became a locally significant problem. The mouths of the Grant and Platte rivers were experiencing rapid siltation by the 1850's affecting the navigation of steamboat traffic.

The introduction of corn to the highly dissected Driftless area uplands initiated a period of maximum environmental degradation from the 1870's through the 1940's (Knox, 1977). The consequence of these land use practices has been enlargement of channel cross section in the headwater reaches while the floodplains and downstream valleys have seen considerable vertical accretion of sediment (Knox, 1972). Soil conservation methods were introduced in the 1950's and have had a moderating effect on sediment loss in southwestern Wisconsin.

10.1.2.2 Identification of Post Settlement Alluvium:

These historical alluvial deposits are frequently found in stream valleys and tributary mouths. They accumulated in

lower order tributary valleys adjacent to cultivated uplands, but are most apparent in higher order stream valleys which drain upland tributaries.

In Pool 11 these historical deposits are usually silty although they may include both coarser and finer textures. They occupy the surface of the landscape creating a unit of variable thickness. These deposits are nearly always found at the mouths of tributaries as they enter the main valley and at the base of alluvial fans.

Historic sediments often occur as laminated bands of variable thickness. Bands may be a centimeter thick or more if a surface is inundated for relatively long periods or if large volumes of sediment are being transported. Usually the laminations are thinner and represent deposition from lower sediment loads. Many of the sites, especially some of the special use areas, illustrate historical deposits occurring in bands. Wolf Creek, Schleicher's Landing, Turkey River, and Mud Lake to name a few, show these post settlement flood deposits occurring in bands.

At other sites these surface deposits are seen as thick, massive, homogeneous units. This situation is most often observed when the unit is composed of silt or clay. Places where these deposits are typically found are in back-water areas that are frequently inundated for long periods. Mouths of tributary streams that enter the main valley away from a major channel are likely sites for this kind of deposit. For example, Lynn Hollow and Muddy Creek manifest this type of historical unit.

Color is often a good indicator of the presence of PSA. Distinguished from the presettlement surface horizon, this unit usually has a brown (10YR 3/3-4/4) color provided the sediments have not been waterlogged for long periods of time. However, if the historical unit is close to the water table, mottling and gleying will affect the color. The more oxidized sediments (mottled) may have a color in the 7.5YR 4/4 range, while the reduced (gleyed) sediments may have colors in the 2.5YR to 5Y 3/1-4/1 range. Color should be a carefully used criterion since sediments reflect the nature of their source region (i.e., uplands or mid channel island) and may inherit alternative properties when subjected to different chemical processes found in a new environment (i.e., floodplain). In addition, areas that have experienced surface erosion prior to post settlement deposition may show little if any change in soil color or texture between the historical and the presettlement material. In situations like this, where unconformities exist, determining the depth of historical alluvium may be more difficult and would likely require more comprehensive analytical techniques.

Historical sediments mobilized from the tributaries are often calcareous because of the presence of carbonate bed-rock and unleached loessal deposits. Testing for carbonates can be accomplished by applying hydrochloric acid to the sample in question. If carbonates are present, the sample

will effervesce. The pre-settlement upland soils initially were leached of carbonates, however, erosion of the surface horizon and exposure of the subsurface horizons and parent material has mobilized calcareous sediment found lower in the profile.

Mining activity was particularly important in mobilizing carbonate material. Lead sulphide (galena) is commonly found in the lower Galena, the Decorah, and the Platteville formations (Heyl et al., 1955). Most bedrock exposures on the upper hillslopes are the Galena dolomite, although at lower elevations near river courses, the Platteville formation and St. Peter sandstone can be observed. Dolomite, a mining by-product, was discarded in tailing piles which can be seen dotting the landscape. In addition, highly calcareous calcite which is in association with the hydrothermal gash vein and pitch and flat mineral deposits was also discarded as mine waste. Angular fragments of dolomite and calcite which have been mobilized from the upland mines can be found in historical deposits in the main valley in Pool 11 and to the north and south of the pool. The limits of these calcareous sediments have yet to be identified.

Historical sediments mobilized from within the pool are much less likely to be calcareous. These are sediments which have been eroded from island and terrace margins or from the channel bed. This material which has been reworked from within the pool is generally leached of carbonates and contains a high percentage of quartz, particularly in the well rounded sand fraction. Consequently, the testing for carbonates through the application of hydrochloric acid will yield negative results.

Morphologic analysis of the unit provides additional useful information regarding the nature and origin of the deposit. For example, a few sites showed evidence of historical deposition from both an upland tributary and from the main valley. One of the Turkey River profiles (see Figure 42) illustrates historical alluvial episodes from both the main channel and from the Turkey River. Alternating bands of calcareous and non calcareous material occur in the profile which is interpreted to represent flood deposits from both sources. Meanwhile, most of the island sites upstream of the Turkey River showed weakly or non calcareous historical surficial units, a condition observed at 13 Ct 215, 13 Ct 219 (Big Pond), and 13 Ct 220.

Soil development is a morphologic parameter used in determining the extent and relative rate of historical alluviation. At most observed locations in the pool, the historical deposits showed little if any soil development. This was especially true in areas where deep burial of the presettlement surface was encountered. However, some locations displayed relatively minor amounts of historical vertical accretion deposits.

These areas with thin veneers of historical overburden in some cases showed weak surficial humification (Al horizon

development) through the incorporation of organic material. Surface horizons developed rapidly compared to the development of subsurface horizons. Cashell (1980), Schafer (1979), and Leisman (1957), have demonstrated that rigorous organic matter buildup began on disturbed surfaces in less than 20 years. Parsons et al., (1970) considered soil development on surfaces ranging in age from historical to at least 5,250 B.P. and discovered that A horizons on the youngest surface may contain as much organic matter as soils on older surfaces. The incorporation of organic material on slowly accreting surfaces is seen on some of the higher surfaces within the pool, for example Potosi canal, and Jack Oak Slough.

Another pedogenic process occurring on these slowly aggrading surfaces is turbation from soil plants and animals which incorporate the post settlement material into the presettlement surface horizon. These slowly aggrading surfaces such as 13 Ct 220, Bertom Lake, and 47 Gt 413, have been stabilized by vegetation and show organic material being translocated down root channels and worm holes. Soil flora provide a mechanism for the downward movement of organic carbon which affects soil development over relatively short periods of time (Crocker, 1967). Hole (1981) and Thorp (1967) emphasize the role of soil animals in the conversion of raw organic material to humus, the mixing of organic and inorganic material, the creation of channels, and the vertical displacement of soil particles.

10.1.2.3 Summary:

In conclusion, the nature and genesis of post settlement alluvium found in Pool 11 reflect different intensities of competing geomorphic and pedogenic processes. At sites where slow vertical accretion exists from infrequent overbank flows, weak surface pedogenic horizons are emerging and in many cases are mixed with the underlying presettlement material. These surficial deposits may, in some cases, contain carbonates, while in other cases they may not. These sites are generally located away from tributary mouths, and are likely to be found on islands toward the upper reach of the pool or on higher terrace surfaces.

Deep historical deposits are commonly seen along tributary mouths where frequent inundation occurs. The backwater effects were greatly increased after the installation of Lock and Dam 11 in the 1930's (Knox, 1977). The raised base level of the tributaries has accelerated the sedimentation process and buried former pre-settlement surfaces with several feet of alluvium. These units are often composed of massive homogeneous silt, but occasionally alternating bands of sand and silt showing abrupt textural contacts can be seen. Such deposits are often calcareous since much of the sediment originates in the tributary watershed. However, non-calcareous historic materials consisting of reworked sand and silt, formerly stored in the pool provide consider-

able post settlement deposits and are found throughout the pool.

10.1.3 Test Excavations:

Test excavations in the alluvial bottoms of the Upper Mississippi valley are always difficult. Most often excavations are abandoned long before reaching what could be considered sterile soil. However, the use of both hand operated and mechanized pumps for local dewatering can be effective to depths of 3-4m (Overstreet 1984a). Excavation to depths beyond 3-4m normally requires the establishment of a sump. This, of course, requires sacrifice of provenience and probable loss of other information associated with the sump pit. Seepage, particularly at the interface of coarse and fine grained sediments, is constant. This enhances opportunities for slumping and excavation below 2.0m is potentially dangerous to the excavation crew and appropriate safety measures should be taken.

A second major problem is that the excavation of saturated fine grained sediments is quite tedious. Dry screening is not possible and various methods of water-screening and chemical flocculation should be investigated. In any event, matrix reduction without destruction of saturated cultural materials, particularly ceramics, is a problem yet to be adequately resolved. Past experience indicates that time allowances for matrix reduction requires a 400 percent ratio of screening to excavation. Finally, recording of profiles can be problematic as all sediments are gleyed. Thus, collection of soil monoliths is recommended.

10.1.4 Ground based remote sensing:

Utilization of ground based remote sensing methods and techniques can add considerable efficiency to survey investigations. These applications, however, are most efficient on site-specific bases. Three remote sensing techniques have been applied on the alluvial bottoms: ground penetrating radar, seismic refraction, and resistivity.

For the most part all have suitable portability and can be transported by small boats to site locations. Ground penetrating radar probably provides the best resolution of interfaces between stratigraphic units, and has been successfully utilized to delineate buried cultural deposits. A major limitation of ground penetrating radar is that in certain matrices, for example gleyed clays, depth of penetration will likely be inadequate to evaluate the entirety of Holocene sediments.

Deeper penetration can be realized with the use of seismic refraction. However, resolution is limited. Generally, seismic refraction is most useful for determination of the depth and relative magnitude of sediment units of different composition. This technique can be quickly utilized, for example, to determine the depth of generally fine grained Holocene alluvium deposited atop coarse grained

Late Woodfordian sediments. The physical characteristics of the technique, that of defraction of "shock" waves, are not appropriate for identifying buried archaeological deposits.

Resistivity can be applied to both problems: the identification of buried archaeological deposits and the identification of matrices of different composition. However, again, the resolution is not as refined as ground penetrating radar. Our experience indicates that resistivity is best applied as a back-up or check of ground penetrating radar results, or in situations where penetration of radar is limited.

All remote sensing techniques at this point in their application in archaeology result in the definition of anomalies. These anomalies which represent the reflection of a radar wave, a refraction of a seismic "shock" wave, or the differential resistance of electrical current in the medium, have to be verified by sub-surface evaluation. Many of these anomalies are of limited archaeological significance representing tree roots, the water table, banded B horizons, or other phenomena. On the other hand verification of anomalies has served to document Pleistocene-Holocene contacts, archaeological deposits ranging from shell middens to lithic scatters, gravel lags, or sub-surface features such as buried walls, refuse pits, or other architectural features.

The major value of these types of remote sensing is that they provide for continuous sub-surface investigation. Because of this feature the techniques are compatible with mapping buried topography, rapidly and accurately delineating buried phenomena, and collecting information beyond the capabilities of hand tools. As well, the techniques, in spite of their reputed high cost, are quite cost effective. When compared to the costs associated with hand operated or machine operated drilling and boring methods, these remote sensing investigations fare well. Seismic refraction, resistivity, and ground penetrating radar can collect information more rapidly (information in this case represents anomalies) and more reliably than random or systematic tight-interval coring. This is particularly noteworthy on the alluvial bottom of the Upper Mississippi River where most site access requires water travel.

10.2 Archaeological Site Distributions:

The present understanding of archaeological site distributions in Navigation Pool 11 is useless for predicting where sites will occur. The reason for this is the lack of understanding of the actual distribution of buried landscapes within the confines of the Navigation Pool. For example, a very complex profile at Ackerman Cut indicates a series of buried surfaces which were stable for periods of time sufficient for soil development to occur. At Ackerman Cut coring and excavation provided important chronological

information relating to these sediments. Because we were lucky enough to identify a buried surface associated with a Madison Ware vessel, we now know that a surface dating to approximately 1,000 A.D. is buried beneath two once-stable surfaces which obviously post-date the vessel. At the same time, the stratigraphy at Ackerman Cut exemplifies the dynamic nature of the sedimentary environment. During certain episodes deposition was due to processes of lateral accretion. The channel would have been active and coarse sediments may have been derived from overbank deposition. At other times, however, finer grained sandy silts and silty sands were apparently deposited by processes of vertical accretion. During the latter events the channel at Ackerman Cut was likely blocked and the area would have been ponded, perhaps serving only as an over-flow channel. These variations in soil development, utilization by past populations, changes in aquatic regimes and in habitat conditions serve to underscore the dangers inherent in attempting to generalize about prehistoric subsistence and settlement patterns in the upper valley floodplain.

Another stratigraphic example where sediments can be dated to considerable depth is the Turkey River bottom. In this locality more than 15' of PSA has been deposited by a variety of geomorphic processes on the 1850 A.D. land surface. Somewhere below this 15' of recent alluvium lies the historic Fox village established in 1783. The depth of prehistoric surfaces has not been identified, let alone evaluated, for the presence or absence of occupied surfaces.

Our survey work has identified a lengthy culture-history for the Navigation Pool 11 environs. Artifacts ranging from Late PaleoIndian through recent historic times have been identified. Interestingly enough all sites that pre-date Early Woodland times, about 2000 B.P., have been identified from terraces. No Archaic or older materials have been identified on the floodplain. Obviously, the logical explanation for this phenomena is that we have identified very few localities on the floodplain where surfaces of Archaic age are accessible. Were we to rely on presently known site distributions, we might conclude, as some investigators have, that Early Woodland and later populations made use of the floodplain environments while earlier residents of the region were "upland adapted." As an alternative, and in spite of the archaeological site distributions, there are no solid bases for the assumption that earlier populations avoided the floodplain habitat. Rather, based on our present understanding of the surficial geology of the floodplain, we predict that in most instances, Middle to Early Holocene occupations are deeply buried. Those localities where we have identified Holocene-Late Woodfordian contacts would have been the most prominent topographic features on the floodplain of earlier times. Situated considerably above water levels and associated aquatic habitats, it is plausible that during Middle and Early Holocene times such localities, which are still

accessible from the present surface, were not favored locales of Archaic and pre-Archaic populations.

Our sample of this context within the pool is not adequate for understanding site densities. However, we have identified localities where sampling could be conducted, and if archaeological sites of Archaic age were located, cultural and natural stratigraphy may be poorly preserved (e.g. Potosi terrace). There is considerable evidence to suggest that episodes of deflation of sandy soils formed on Late Woodfordian surfaces were commonplace during the Mid-Late Holocene (Overstreet 1984b). Thus, it is quite possible that older, prominent landforms in the pool, now represented by island cores or relict terraces, may have been significantly disturbed by natural erosional (eolian) processes.

The inescapable conclusion, given these considerations, is that present site distributions are heavily skewed and historic and late prehistoric sites are over-represented. Sites from time periods before the Woodland continuum are underrepresented, a function of limited access to appropriately aged surfaces. Until such time as pre-Woodland sites are identified in the now-submerged or gleyed alluvial matrix, subjected to appropriate evaluation, and placed within the context of past landscapes, any efforts to reconstruct settlement and subsistence patterns in the Upper Mississippi Valley will be purely speculative.

10.3 Predictive Model of Past Landscapes:

This predictive model sets forth both hypothetical and empirically identified Holocene landscapes now masked by the present Pool 11 floodplain configuration. The model is derived from sub-surface sampling at 31 localities on the floodplain, archaeological survey investigations, and archive and literature sources. Sampling was biased in many respects. First, special use areas were examined owing to contractual responsibilities which derive from Corps of Engineers cultural resource management needs. Second, sampling was conducted at the locations of archaeological sites identified from literature sources and from field surveys. Third, specific localities were selected because of their unique topographic characteristics. Fourth, fluctuating water levels in the pool throughout the 1984 field season often dictated access to particular landforms and some areas sampled were simply second choice grab samples because preferred localities were inundated. Finally, survey and coring investigations were concentrated in the upper reaches of Pool 11 because the southern segment is permanently submerged beneath the pool impoundment.

The model is both visual and descriptive. The visual presentation consists of two valley cross-sections developed from our own sub-surface investigations and those collected from earlier studies. Wherever possible, sediment ages are indicated based on diagnostic cultural remains or the interface between presettlement and post-settlement

surfaces. Of course, many of these ages are estimates based on incomplete chronological information and should only be evaluated as estimates. The descriptive aspects of the model identify typical geomorphic contexts where surfaces of various ages, and hence archaeological sites of various ages, can be expected to occur.

10.3.1 Summary of Landforms and Alluvial Contexts:

Within the valley wall margins of Pool 11 different aged landscapes have been observed and described. These landscapes have been shaped by depositional and erosional processes historically and throughout the Holocene. Judging from observed soil profile development, from topographic maps and air photographs, and bore hole logs, most of the pool has remained relatively unchanged probably since the late Holocene.

The high Mississippi terraces found discontinuously along the valley margins represent the oldest exposed surfaces in the valley. Some soils observed on these surfaces show deep weathering profiles with illuvial horizons occurring at considerable depth. Other soils were severely eroded showing little evidence of profile development but instead had lag deposits of coarse outwash material and in some cases cultural material. From both pedogenic and archaeological perspectives all of the profiles studied on this older, presumably early Holocene surface suffered eolian reworking to varying degrees.

The lower surfaces including the low terraces and islands show a complicated history influenced by major channel lateral reworking, surface soil development, episodes of vertical accretion, and in some cases aggradation from minor channels. Stratigraphic units mapped from bore hole logs near Cassville and Potosi (Figures 58 and 59) suggest that subsurface lateral accretion ridges composed primarily of sand are not uniformily capped with finer grained silt and clay. At these two cross sections the subsurface topography differs considerably from what is observed at the surface. At Cassville this is certainly influenced at least in part by sediment contributed from the Turkey River. The bore hole data from Potosi show considerable fill of fine grained material occupying the approximate center of the floodplain. At these two valley cross sections surface topographic expression reflecting an analogous subsurface topography is not apparent. However, upstream in the pool the subsurface topography is unknown and may be represented differently.

The magnitude of fine grained alluvial fill seen in these cross sections suggests that the main channel has remained in its present position for a significant, but unknown, part of the Holocene. Further evidence supporting this is the presence of developed soil horizons found in many areas located along the main river course.

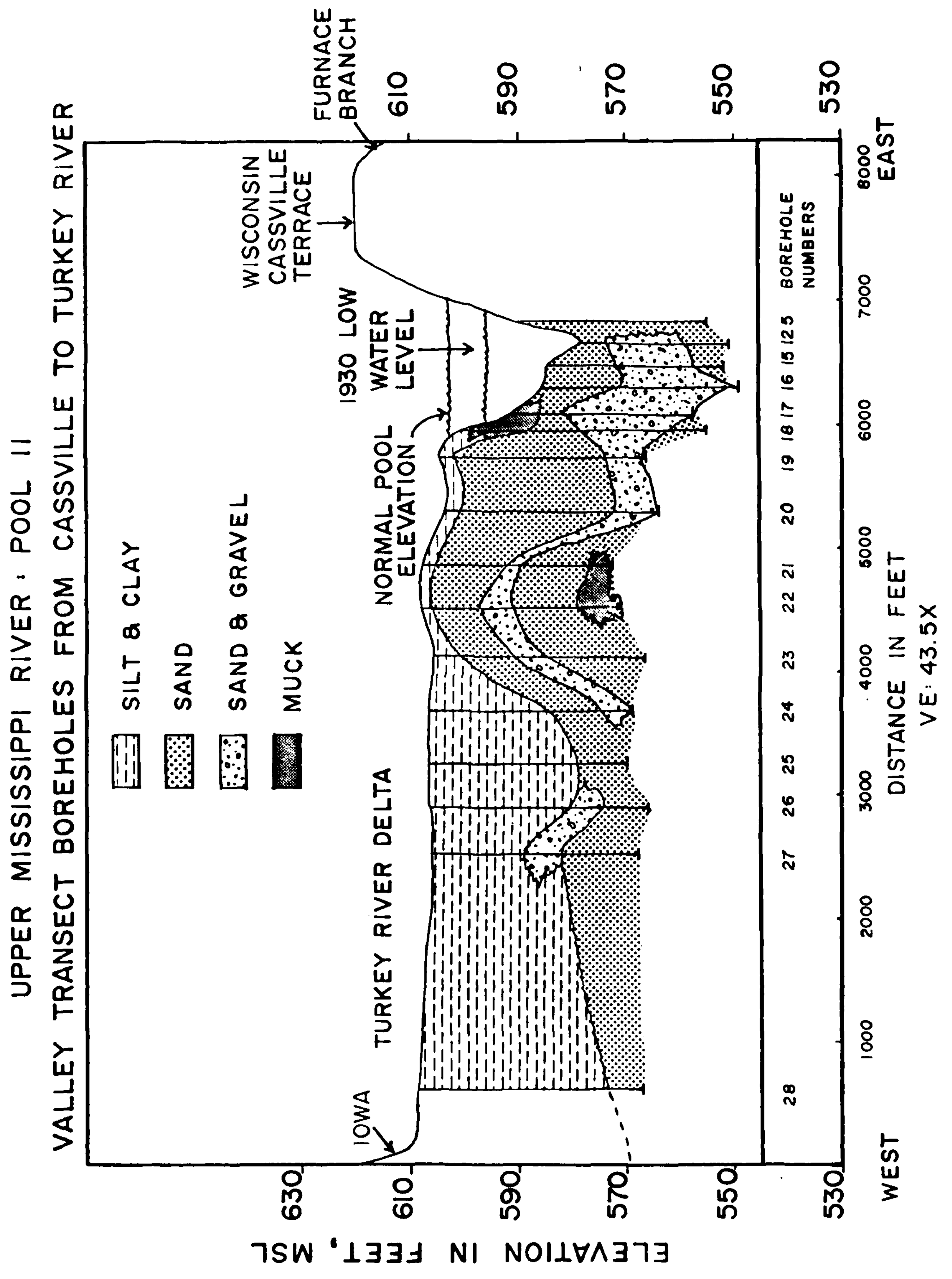


Figure 57 : Valley Cross-section, Cassville-Turkey River.

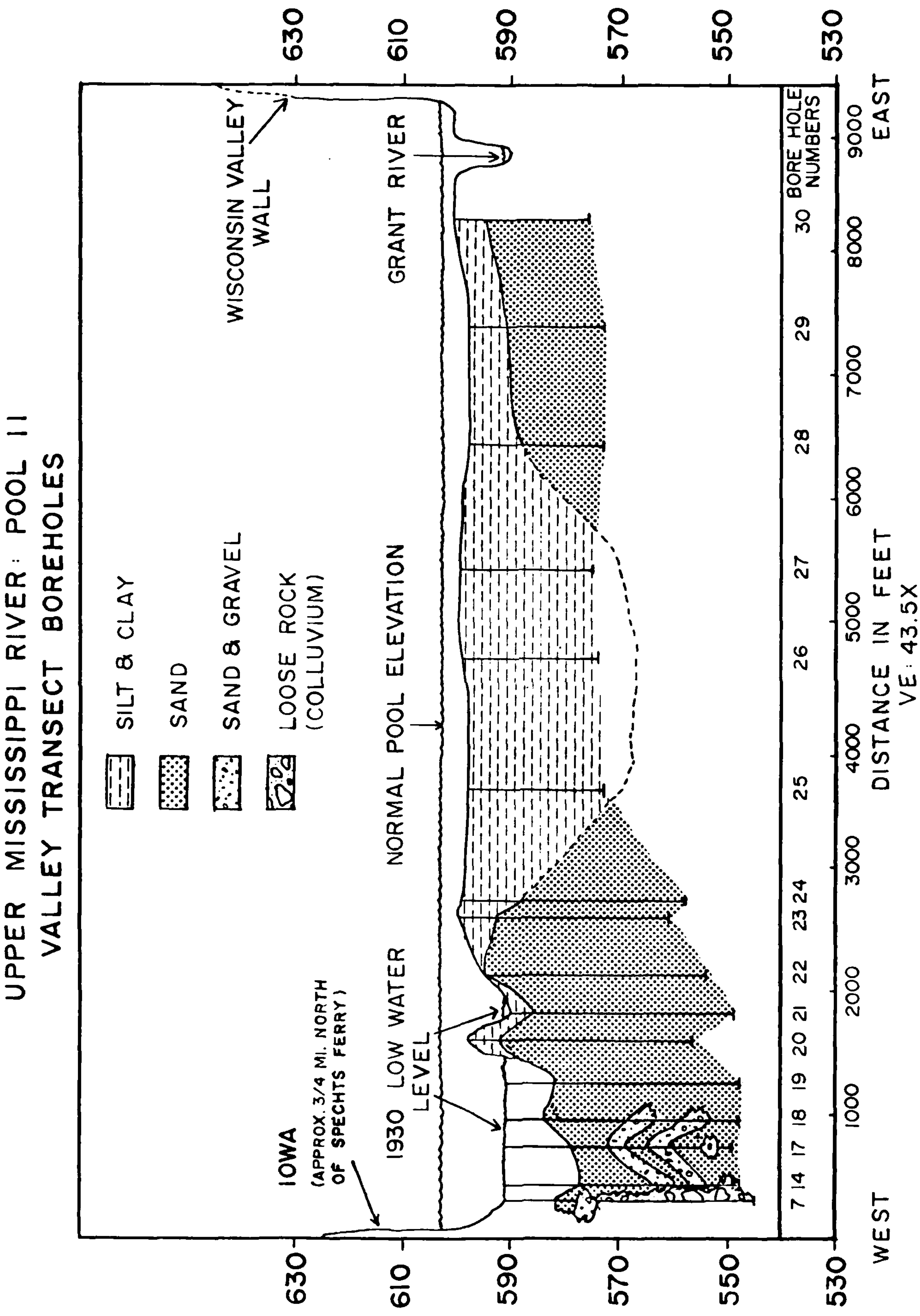


Figure 58 : Valley Cross-section, .75 miles north of Specht's Ferry.

Although much of the valley remains unchanged since the late Holocene, major morphologic changes in the tributary reaches entering the valley have occurred. These patterns are primarily a result of historical land use changes and tributary channelization. Channelization creates a variety of cause and effect relationships which are discussed in detail by Dunne and Leopold (1978). The increased sediment yields associated with mining and agricultural land use has choked the mouths of tributaries with several feet of alluvium. Although the evidence of historical disturbance is widespread throughout the pool, the effects are primarily confined to areas adjacent and immediately downstream from the tributary mouths and in low velocity backwater areas.

Smaller amounts of historical material are usually found on higher terrace surfaces, on lower terraces where major channel velocity is sufficient to transport sediment, and on the upstream portions of major islands. Downstream portions of the islands appear to be accumulating sediment, a phenomenon which could be observed from the air photographs and documented from field inspection.

10.3.2 Archaeological Potentials of Pool 11 Landforms:

Alluvial landforms contained within the limits of Pool 11 reflect a mosaic of different aged surfaces. As a result of impoundment, these surfaces are more apparent in the upper reaches of the pool while many of the lower terrace surfaces and islands below Potosi are permanently inundated. The larger islands, particularly Jack Oak and 189, appear to be stable features of at least late Holocene age judging by their relative degree of soil development. Older surfaces may exist on low terraces along the channel margins. Some generalizations can be made regarding known and suspected archaeological contexts in the pool, however, more field study is necessary in order to better understand the complexity of these landforms and subsequent chronology of alluvial events.

10.3.2.1 TERRACES:

10.3.2.1.1 Tributary Terraces:

Very little direct field work concentrated on tributary terraces, hence their potential regarding cultural context is largely unknown in the pool. The tributary terrace site at Anthony's Resort is likely disturbed and not representative of what may exist on these surfaces. At Furnace Branch slightly higher tributary terraces exist although no cores were taken from these surfaces. These terraces may contain a more complete Holocene alluvial chronology but additional work should be initiated in order

to substantiate amounts of historical sedimentation as the magnitude of burial is at this time largely unknown.

10.3.2.1.2 Mississippi High Terraces:

For the most part these areas have escaped historical sedimentation. However, soil erosion has occurred on many of these surfaces, largely a result of the droughty nature of the coarse textured sediments found there. Eolian reworking of surficial deposits presumably occurred when lower water tables and a lower vegetation density stimulated surface instability. Surficial instability may have occurred throughout much of the middle and late Holocene, a response to the persistence of climatic regimes favoring a more westerly component of the upper air flow. Such instability may also have been affected by human behavior on the terrace surfaces.

Field work done at Jack Oak Slough, and the Grant River Public Use Area suggest periodic instability on these higher surfaces. The cultural material concentrations seen at Grant River indicate that surface deflation has occurred perhaps several times during the Holocene. This was also supported sedimentologically with outwash pebbles and granules visible relatively high up in the profile. These pebbles and granules were observed in a well sorted coarse silt to very fine sand matrix which would tend to preclude fluvial processes (Overstreet, 1984b). Although cultural material was not observed in the profile seen at Jack Oak Slough, similar behavior in the stratigraphic column was seen. In contrast to the Grant River Public Use Area, Jack Oak Slough showed a relatively well developed paleosol beginning at 65cm which contained a textural and structural B horizon. This buried soil indicates that perhaps surface stability existed for a thousand years or more (Berg, 1984).

The higher terraces from Guttenburg to Sinnipee may have preserved archaeological contexts, particularly in areas where alluvial fans have encroached upon the surface of the terraces along the valley margins. These sites may contain a more complete Holocene history although the amount of burial from Holocene and historical sediments may be deep. Fans which are observed to the east of sites 47 Gt 24 (Osceola) and 47 Gt 413 are examples where potential is relatively high.

10.3.2.1.3 Mississippi Low Terraces:

The low terraces, which are one to two meters lower than the higher terraces, are now frequently inundated by the raised pool level and reflect a complicated geomorphic history. The creation of the terrace is evidence of an erosional episode which may have been caused by uplift, climatic change or the lowering of baselevel (Schumm, 1974). Although the age of these terrace surfaces is practically unknown, some general statements can be made. The ridge and

swale morphologic features seen on many of these low terrace surfaces indicate present and past major channel orientation. Site 47 Gt 413 is located on a portion of the former floodplain which is presently undergoing active lateral erosion. This site illustrates an arcuate ridge and swale system with a different orientation compared to the present ridge and swales under construction. The interpretation is that this site encompasses a relict series of landforms which was developed when Cassville Slough had a much different orientation in the valley. These landforms are presently being reworked while upstream younger analogous features are being constructed under the present channel system. Soils observed on this apparently older surface show a greater degree of development compared to the profile seen across the valley at site 13 Ct 215 which is on the west end of Island 189. Based upon soil development, the pedon observed at 13 Ct 215 represents one of the best developed profiles studied anywhere in the pool.

In contrast, these low terraces in most areas throughout the pool are adjusted to a more contemporary Late Holocene regime based upon the orientation of the ridges and swales concomitant to the present major channel river course. In addition, some of these lower surfaces have been reworked by minor channels, a situation observed at Bertom Lake, while others have been buried by historical alluvium.

These lower river terraces reflect a wide variety of different aged surfaces, some of which have been affected by minor channel reworking and by tributary burial. Geomorphic histories tend to be complicated. As a result, correlations of terrace surfaces and alluvial fills over large areas cannot be made because thresholds may have been exceeded, initiating instability in different reaches of the valley at different times (Schumm, 1974). Since alluvial chronologies on these low surfaces portray a wide range of variability within the pool, their archaeological potential is predictably high but has not been documented by extensive excavation.

Site 47 Gt 413 shows certain similarities to 47 Cr 340 just north of Prairie du Chien (Overstreet 1984a, Church 1984). Cultural materials of pre-Woodland age were found at both sites just above a surface composed of coarse sands and gravels. Unfortunately, diagnostics were not recovered in either case and it is difficult to assess the chronology in more refined terms. These contexts are important for two major reasons. First, the silty Holocene matrices contain significant amounts of datable diagnostic cultural materials that can be applied to refining Holocene sediment chronology. More extensive excavations at these sites will provide information critical to understanding the evolution of the floodplain landscape. At an unknown point in time the floodplain aggraded to a point where it began to capture or cover the low terrace margins. It is important to identify this point in time as well as to evaluate the nature of the now-capped Late Woodfordian surface. It may be that the

least disturbed Early-Middle Holocene surfaces associated with cultural materials will be found in these environments. A second important issue is the identification and dating of apparent widespread reworking of terrace surfaces during the Holocene. Presently, it appears that eolian reworking destroying much of the archaeological stratigraphic record persisted until Late Holocene times (Overstreet 1984b). More detailed investigation of the Pleistocene (Late Woodfordian)-Holocene contact at 47 Gt 413 or 47 Cr 340 would provide valuable insights relating to both the timing and effects of Holocene climatic events on the stability of Late Woodfordian surfaces.

10.3.2.2 TRIBUTARY FLOODPLAINS:

Many of these alluvial landforms have undergone considerable historical modification both from sedimentation and from channelization. Even in floodplains where only a few meters of post settlement alluvium is encountered such as in Furnace Branch, lateral migration has reworked the floodplain perhaps several times during the Holocene.

Historical sedimentation dominates the alluvial chronologies of these floodplains. In many cases the dark organic-rich presettlement surface horizon was not observed owing to its depth. Several studies have documented the magnitude of historical deposition on Driftless area floodplains (Happ, 1944; Knox, 1977; Magilligan, 1983). The accelerated rates of floodplain aggradation result from a dramatic increase in sediment loads and from base level changes. The characteristics of the tributary longitudinal profile are determined by base level of the master stream (Leopold and Bull, 1979). The increase in water surface elevation through pool impoundment has raised the base level of the tributary streams causing aggradation in the lower reaches of their floodplains. The study of several sites within this geomorphic setting has found thick units (greater than 2m) of historical material especially where the tributary mouths are encountered. As a result of the processes of lateral erosion and vertical aggradation acting upon the tributary floodplains, the archaeological potential in most of these areas within the pool would be relatively low.

This statement of archaeological potential should be judiciously applied as it is hindered by two serious limitations in our data. First, the depth of post-settlement sediments is so extensive on these floodplains that in many instances we could not even observe the depth of the pre-settlement surface. We suspect that lateral migration of the tributary streams has been significant, thereby destroying the context of many archaeological sites located in such settings. However, before such statements can be accepted or rejected, detailed studies of relict (paleo) channels would have to be conducted. Historical sources such as maps and aerial photographs document the extensive

lateral movement of such streams from late 19th century to present (see for example Overstreet 1983: 6-8). In contrast, it should be noted that we have virtually no data relative to channel migration or stability for pre-historic eras.

10.3.2.3 MISSISSIPPI RIVER FLOODPLAIN:

Two islands (Jack Oak and 189) were incorporated into the study of Pool 11 and reflect complicated alluvial histories. The islands show a chronology of both lateral and vertical accretion episodes, complicated in some cases by fluvial events from minor channels. Soil profiles studied on the islands, particularly on the outer ridges, show developments that suggest these landforms have been in existence for some period of time, perhaps since the Late Holocene.

Some distinctions can be made regarding the two islands. On Island 189 two sites located on outer ridges (13 Ct 220, 213) showed good soil development with pedogenic B horizons with relatively little vertically accreted Holocene silt. Ackerman Cut, on the other hand, showed a massive Holocene silt unit. Apparently, a longer Holocene record may exist at Ackerman Cut although the effects of the minor channel connecting the two major channels likely influenced the alluvial history of the site. The silt unit of undetermined thickness seen at the cut implies that the interior of this island may represent a more complete Holocene record. However, additional deep cores must be taken from the island interior in order to assess the magnitude of Holocene fine grained accumulation. As well, controlled excavations need to be conducted for recovery of a larger sample of cultural materials and identification of datable contexts.

In contrast, Jack Oak Island shows a different alluvial history. Unlike Island 189, this island showed little vertical accretion silt deposits. The Jack Oak Island profile which extended to 4.15m illustrates a fining upward sequence of considerable scale. This profile is similar to the other two profiles seen on ridges progressively further away from the island center. Subsurface horizons exist at all three sites on the island in the form of clay lamellae. Due to similar degrees of soil development this island was probably rapidly developed, unlike the genesis of 189. The age of the island is not clearly determined because of its location just downstream from a major channel constriction where stream velocity may be sufficient to promote transportation of silt sized particles thus inhibiting deposition. However, the relative lack of silt capping the surface and the degree of soil development would suggest that Jack Oak island is younger than 189.

Historical modifications of the islands have been occurring in response to the raised pool level. The

increased frequency of overbank flow has begun to deposit sediment on the islands. This is commonly observed and evidenced by sediment accumulations trapped by felled trees (Sigafoos, 1964). At the same time the raised pool level has promoted active lateral erosion along the island margins.

The archaeological potential of major islands in the Mississippi is now demonstrably high (Stoltman et al. 1982; Boszhardt and Overstreet 1982; Boszhardt 1982; Theler 1983; Overstreet 1984a) in Navigations Pools 10, 11, and 12. Unfortunately, most investigations (including this one) have for obvious reasons focused on erosional environments at the lateral margins of islands where site identification is simplified. Church (1984) and data compiled by Anderson in this report both attest to the stability during Holocene times of major channels of the Mississippi River. Theler has provided substantial evidence regarding the intensive exploitation of shoreline resources (e.g. fresh water mussels). In spite of these important contributions little information has been provided for island interiors, back-water localities within island settings (e.g. lakes and ponds), or from surfaces that pre-date Woodland times. Given the distribution of buried surfaces identified from test excavations, silt probes, bucket augers, and remote sensing during these investigations and those of Church 1984) and Overstreet (1984a), we feel no reluctance to predict that pre-Woodland occupations are intact at substantial depths below the contemporary surface.

Unfortunately, only limited evidence is available from the Upper Mississippi River floodplain. Further, additional evidence will not be revealed unless surface collections are conducted during infrequent episodes when river levels are abnormally low, a phenomenon that will occur less than once a year for most of the Upper valley. More promising are the prospects for deep excavations (beyond 4.0m) at appropriate localities (e.g. 47 Gt 314, Ackerman Cut-13 Ct 210) relying on dewatering and shoring of excavations.

11. CONCLUSIONS AND RECOMMENDATIONS:

11.1 Study Summary:

The objectives of this research have been realized. Future management needs relating to Section 106 compliance, erosion monitoring, permitting, leasing, and recreational development can now be effectively implemented. In addition, we believe that the results of these investigations will have wider application than cultural resources management within the framework of Navigation Pool 11. Issues have been raised, questions addressed, and methods and techniques developed that should be useful to others conducting research in alluvial environments in the

Upper Mississippi valley. The investments in research conducted in Navigation Pools 10, 11, and 12 have begun to yield tangible results. It is now clear that compliance surveys on site specific bases are often wasteful of both time and money, particularly in the absence of appropriate overviews such as those provided by these investigations and Boszhardt and Overstreet (1982), and Boszhardt (1982). Programmed, well designed research with multiple objectives clearly results in more effective management, limits duplication of effort and waste, and provides more meaningful contributions to the study of history and prehistory. These factors notwithstanding, serious limitations still exist. These limitations are noted and recommendations are made for their resolution.

11.2 Study Limitations:

Two major limitations are identified. First, we have yet to adequately evaluate archaeological sites on (in) the floodplain that pre-date 300 B.C. Recent studies cited in this report and these investigations have documented that older surfaces, in some cases inhabited, are known to exist in the alluvial matrix of the Mississippi River floodplain. Until these deeply buried sites are subjected to close scrutiny interpretations and management of Archaic and earlier sites in such environments is seriously hindered.

There are those who have stated that the Early-Middle Holocene floodplain was an inhospitable habitat. Others have denied the existence of intact Early to Middle Holocene surfaces in the floodplain matrix, assuming in the absence of any significant data that all such deposits have been reworked by the lateral migration of Mississippi River channels. More accurately, we simply do not have any evidence for such assumptions. Church (1984) and Jeffrey Anderson in this report have noted the long-term stability of main channels in the Mississippi River in the Pool 10 and 11 localities. The theoretical debate will continue unresolved until such time as more detailed studies designed to evaluate the precise age and depth of Holocene surfaces in the alluvial matrix are implemented. The effects of climate, glacial meltwaters of presumed catastrophic magnitudes, rates of floodplain aggradation, and erosional and depositional sequences require such study for their clarification. The range of human use of the Mississippi floodplain and the paleohydrology of the Mississippi River will remain a moot point until the appropriate empirical data are collected.

11.3 Recommendations:

In order to resolve many of the current research and management problems identified, it is recommended that a detailed study transect be investigated. Our current knowledge indicates that the most effective locality for

such a transect begins on the east at the Cassville high terrace across the low terrace at 47 Gt 413 (see Figure 59). The study transect would bisect Island 189 (including investigation at backwater ponds, lakes, and over-flow channels). The study transect would then terminate on the southern margins of the Guttenburg terrace. Deep excavations should be conducted at Ackerman Cut (13 Ct 210) and at the southern margins of Big Pond where known archaeological sites have been identified and older surfaces are known to exist.

Methods and techniques of investigation will have to be tailored to the problems of conducting investigations in gleyed sediments to depths adequate to penetrate the Holocene matrix. This will require both hand and mechanized auger investigations dependent on the depth of the matrix. As well, again dependent on the unknown depth of the matrix, dewatering and shoring of excavation units would be necessary. Finally, the technical expertise and feasibility of these logistical problems is perhaps best explored by Operations Division of the Rock Island District Corps of Engineers. The purpose of the transect is to provide a detailed stratigraphic profile across the valley floor incorporating a refined chronology of Holocene sediments based on the radiocarbon assay of organic samples collected from appropriate environments and the utilization of cross-dating and radiocarbon chronology of cultural contexts from site excavations. Together, these information sets will provide the most detailed statement available for the evolution of the Holocene floodplain and human activities and use of that environment throughout the Holocene.

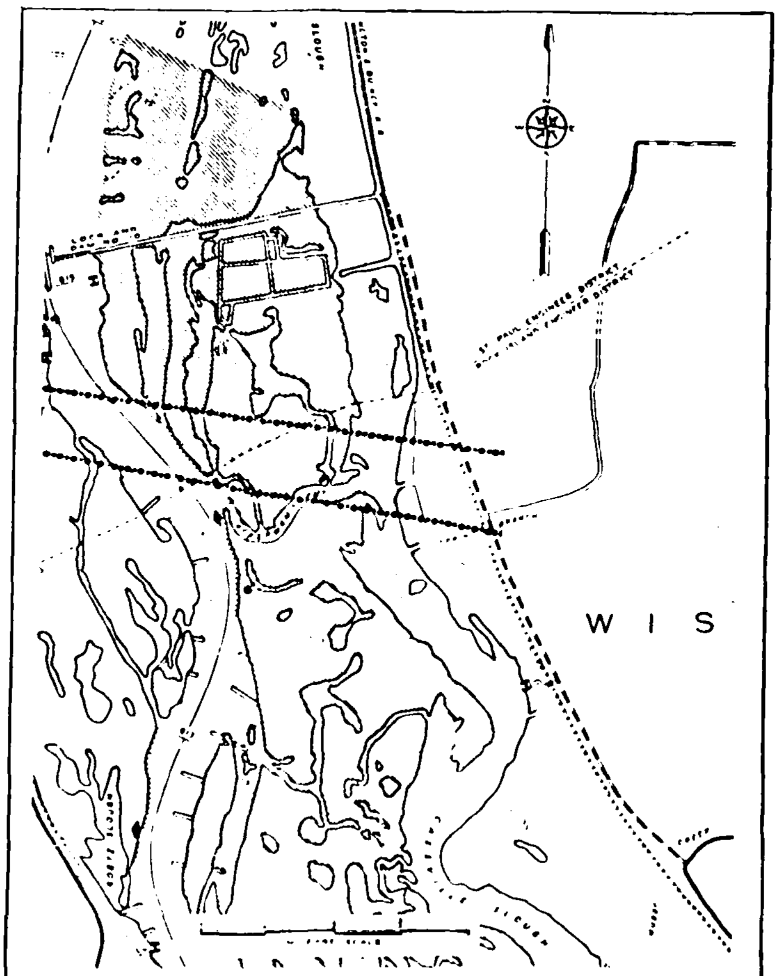


Figure 59: Location of proposed study transect.

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WISCONSIN

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Stonefield (Nelson Dewey Plantation) (05-17-70), Cassville

IOWA

Albertus Building (04-03-79), Guttenberg

Historic Resources of Guttenberg (pending), Guttenberg

INTERVIEWS

The following individuals were contacted for information on the history and prehistory of the study area during the course of the literature search and records review:

Bob Camardo, Mineral Point, Wisconsin

Carol Cartwright, Madison, Wisconsin

Ralph Christian, Architectural Historian, Iowa Division of Historic Preservation, Des Moines, Iowa

Jerome P. Daniels, Director, Elton E. Karrmann Library, University of Wisconsin-Platteville

Richard Dexter, Historic Preservation Division, State Historical Society of Wisconsin, Madison, Wisconsin

Jean Ditter, Cunningham House Museum, Platteville, Wisconsin

Dr. Joan E. Freeman, State Archaeologist, State Historical Society of Wisconsin, Madison, Wisconsin

Mary Freymiller, Wisconsin Area Research Center, University of Wisconsin-Platteville

William Green, Historic Preservation Division, State Historical Society of Wisconsin, Madison, Wisconsin

Mrs. Madeline Grimes, President, Grant County Historical Society, Platteville, Wisconsin

L. Frank Huntington, Transportation Planner, Southwest Wisconsin Regional Planning Commission, Platteville, Wisconsin

Mrs. C. D. Kaltenbach, Potosi, Wisconsin

David Kaltenbach, Potosi, Wisconsin

Thomas B. Lundeen, Department of History, University of Wisconsin-Platteville

Mary Ann McBride, Iowa Division of Historic Preservation, Des Moines, Iowa

Dr. Joseph Mihelic, Archivist, University of Dubuque, Dubuque, Iowa

Bill Mrdeza, Planner, Southwest Wisconsin Regional Planning Commission, Platteville, Wisconsin

John T. Penman, State Historical Society of Wisconsin, Madison, Wisconsin

ger L. Sedgwick, Potosi, Wisconsin

Charles R. Smith, U. S. Army Corps of Engineers, Rock Island District, Rock Island, Illinois

Mary Taylor, Architectural Historical Consultant, Madison

Joseph A. Tiffany, Office of State Archaeologist, Iowa City, Iowa

Ruth Vondracek, Office of State Archaeologist, Iowa City, Iowa

Deb Zieglowsky, Office of State Archaeologist, Iowa City, Iowa

Mr. Mark Schleicher, Cassville, WI; Mr. Leroy "Hatch" Ackerman, Cassville, WI; Mr. Joseph Fishnick, Cassville, WI; Mr. and Mrs. Gary Ackerman, Guttenberg, IA; Mr. John Lyons, U.S. Fish and Wildlife Service, Cassville, WI; Dr. Harris A. Palmer, Platteville, WI; Mr. John Strelectcky, Dubuque IA; Mr. Jerry Enzler, Riverboat Museum, Dubuque, IA; Mr. Roger Osborn, Riverboat Museum, Dubuque, IA; Mr. Al Reed, Prairie du Chien, WI; Mr. Fred Moore Jr., Prairie du Chien, WI; Mr. Fred Moore Sr., Prairie du Chien, WI; Caretaker, Mud Lake Recreation Area, Mud Lake, IA; Mrs. Gladys Henkels, Mud Lake, IA; Staff: Rollo Jameison Museum, Platteville, WI.

AREA RESEARCH CENTERS, COUNTY and LOCAL HISTORICAL SOCIETIES, GOVERNMENT AGENCIES, LIBRARIES, MUSEUMS and STATE PARKS AND NATURE PRESERVES

Information on the history and prehistory of the Navigation Pool 11 study area is available at the following places:

AREA RESEARCH CENTERS

Research Center for Dubuque Area History, Wahlert Memorial Library, Loras College, Dubuque, Iowa

Wisconsin Area Research Center, Elton E. Karrmann Library, University of Wisconsin-Platteville

COUNTY and LOCAL HISTORICAL SOCIETIES

Clayton County Historical Society, Strawberry Point, Iowa

Dubuque County Historical Society, Dubuque, Iowa

Garnavillo Historical Society, Garnavillo, Iowa

Grant County Historical Society, Platteville, Wisconsin

Potosi Township Historical Society, Potosi

GOVERNMENT AGENCIES

Anthropology Office Museum Division, State Historical Society of Wisconsin, Madison

Historic Preservation Division, State Historical Society of Wisconsin, Madison

Iowa Division of Historic Preservation, Des Moines

Office of State Archaeologist, East Lawn, University of Iowa, Iowa City

Southwestern Wisconsin Regional Planning Commission, Platteville

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Memorial Library, University of Wisconsin-Madison

Platteville Public Library, Platteville, Wisconsin

State Historical Society of Iowa Library, Iowa City, Iowa

State Historical Society of Wisconsin Library and Archives, Madison, Wisconsin

University of Iowa Library, Iowa City, Iowa

Wahlert Memorial Library, Loras College, Dubuque, Iowa

MUSEUMS

Ann and Wilson Cunningham House Museum, Platteville, Wisconsin

Fred W. Woodward Riverfront Museum, Ice Harbor, Dubuque, Iowa

Garnavillo Historical Society Museum, Garnavillo, Iowa

Mathias Ham House Museum, Dubuque, Iowa

Mining Museum, Platteville, Wisconsin

Nelson Dewey House and Farmstead, Nelson Dewey State Park, Cassville, Wisconsin

Stonefield Village and State Farm Museum, Cassville, Wisconsin

Upper Mississippi River Fisheries Management Station and Aquarium, Guttenberg, Iowa

STATE PARKS and NATURE PRESERVES

Nelson Dewey State Park, Cassville, Wisconsin

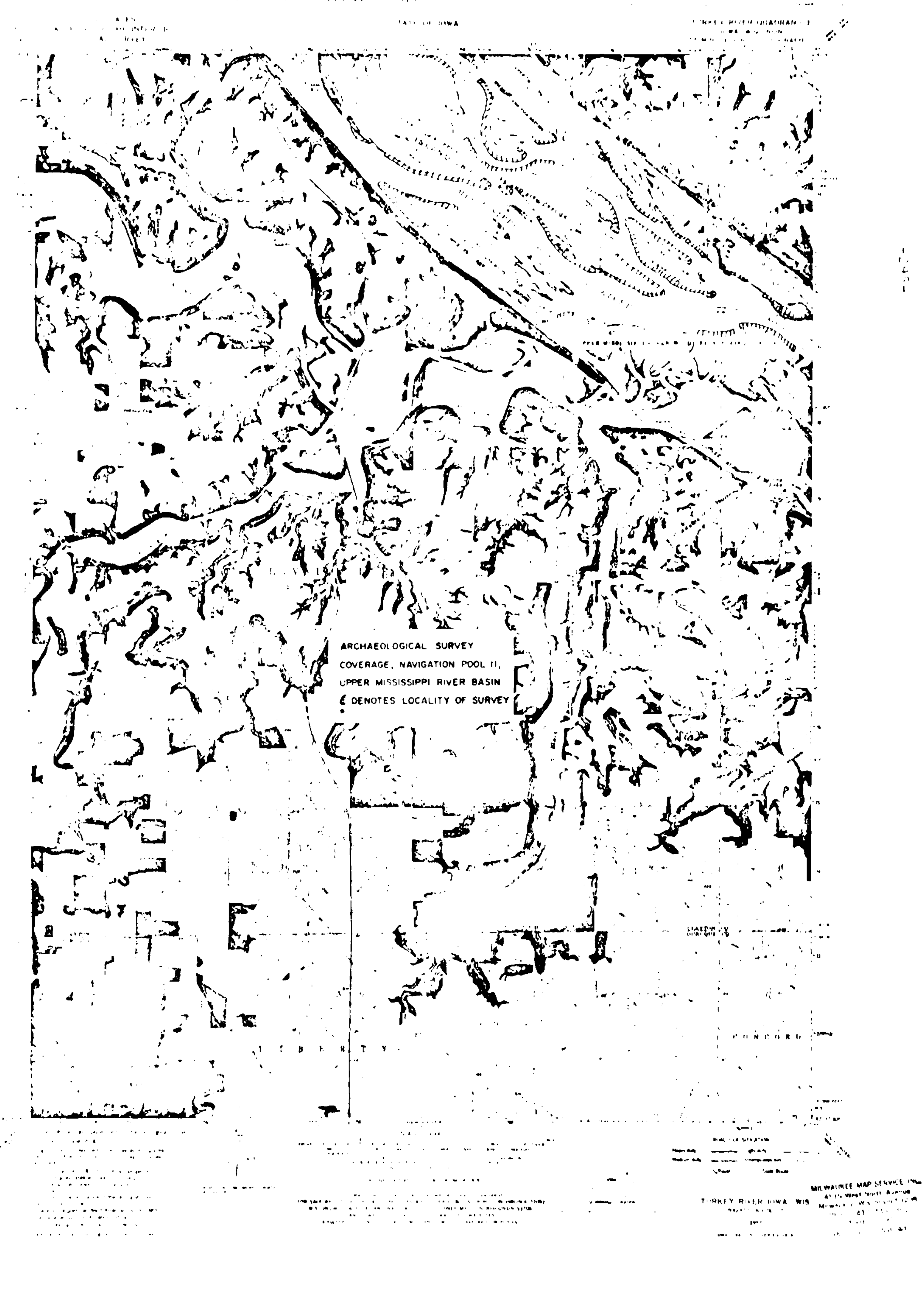
Turkey River Mounds State Preserve, Guttenberg, Iowa

POSTCARDS

TURN-of-the-CENTURY POSTCARDS

Dewey's Ruins, Cassville, Wisconsin
Hotel Denniston, Cassville, Wisconsin
High School, Potosi, Wisconsin
Business District, Potosi, Wisconsin
North Main Street, Potosi, Wisconsin
Spechts Ferry, Iowa

Plate I: Archaeological Survey Localities.


ARCHAEOLOGICAL SURVEY
COVERAGE, NAVIGATION POOL 11,
UPPER MISSISSIPPI RIVER BASIN
DENOTES LOCALITY OF SURVEY
LIBERTY
CONCORD

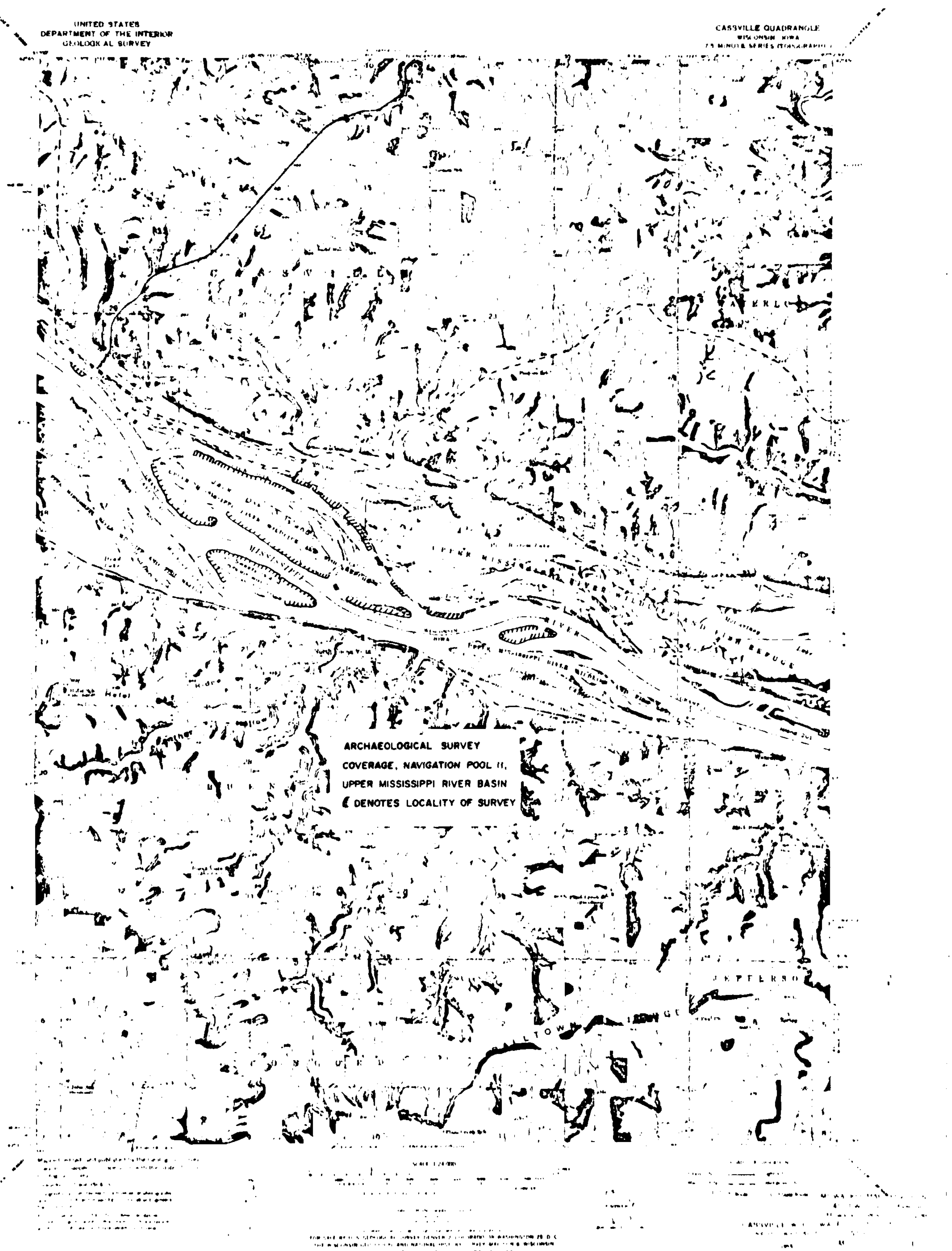


Plate III: Archaeological Survey Localities.

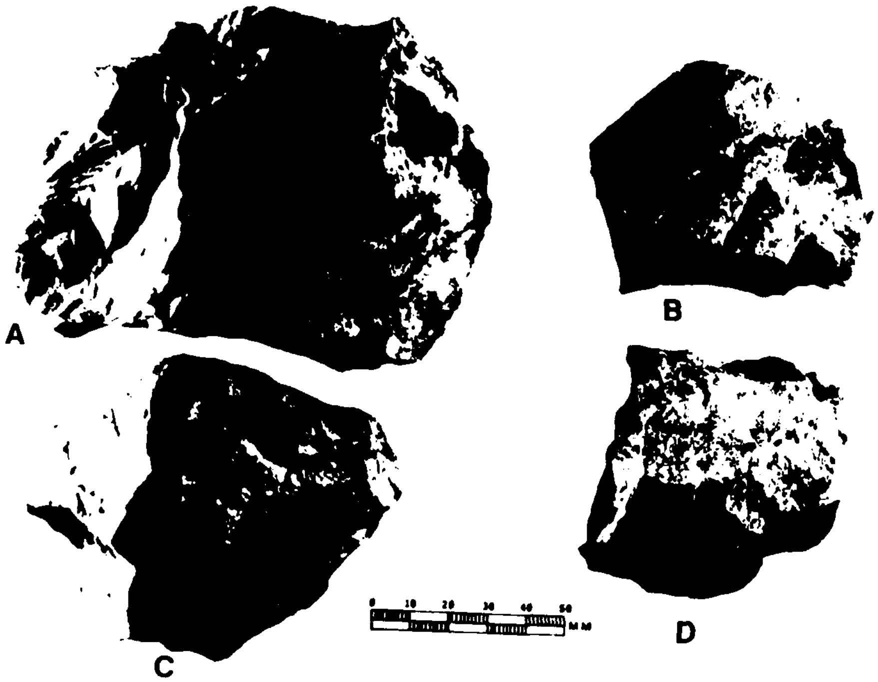
Key to Plate IV:

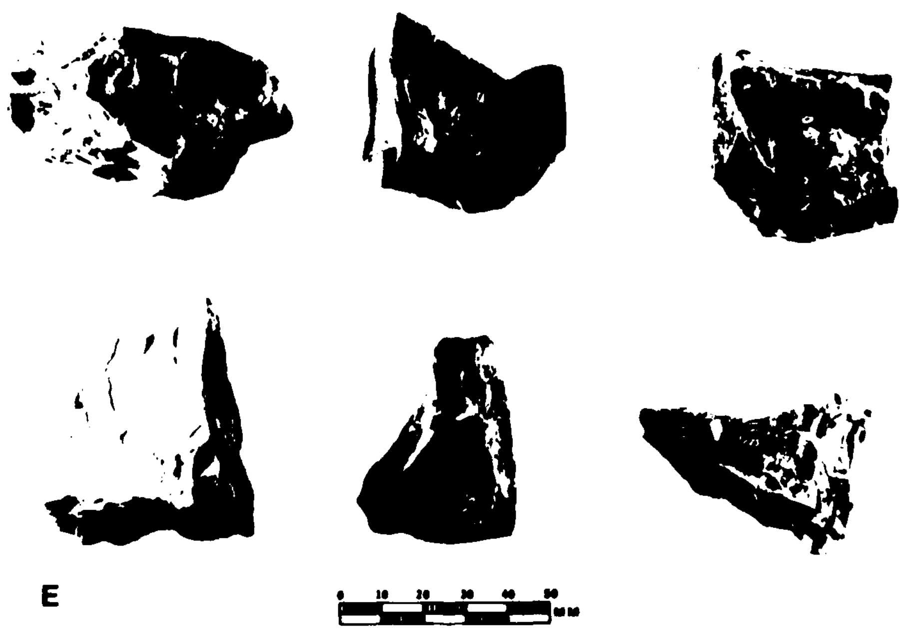
A, B. Large Chert shatter from the Dewey Creek Site (47 Gt 411).

C, D. Large Chert shatter from the Dietrich Dam Site (47 Gt 412).

E. Chert shatter from the Dietrich Dam Site (47 Gt 412).

PLATE IV





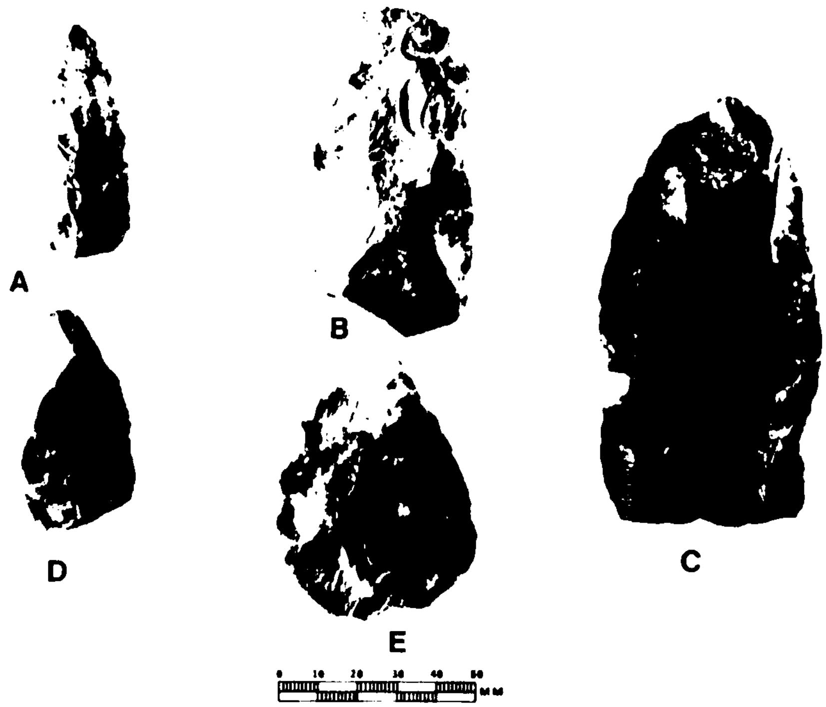
Key to Plate V:

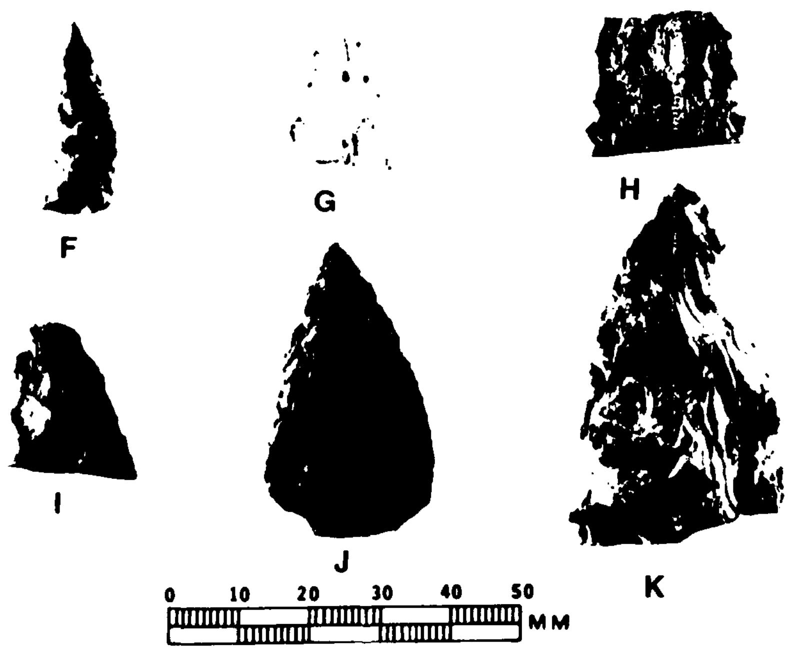
A, B, C, E. Chert bifaces from the Dietrich Dam Site (47 Gt 412) (C is heat treated).

D. Chert blank from the Dietrich Dam Site (47 Gt 412). Striking platform is at top.

F-K. Blade portions of broken chert bifaces from the Dietrich Dam Site (47 Gt 412).

PLATE V





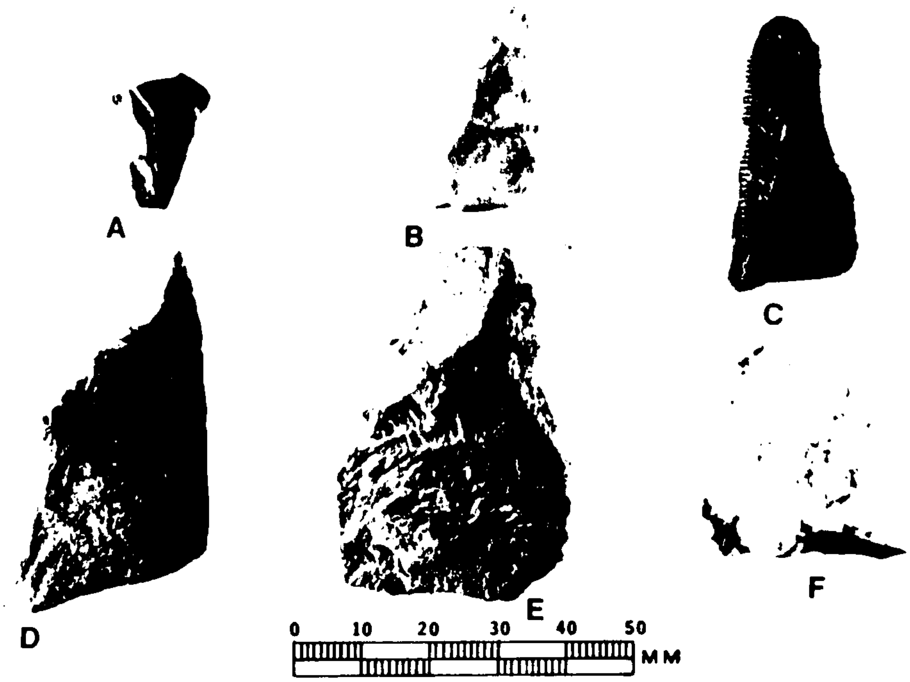
Key to Plate VI:

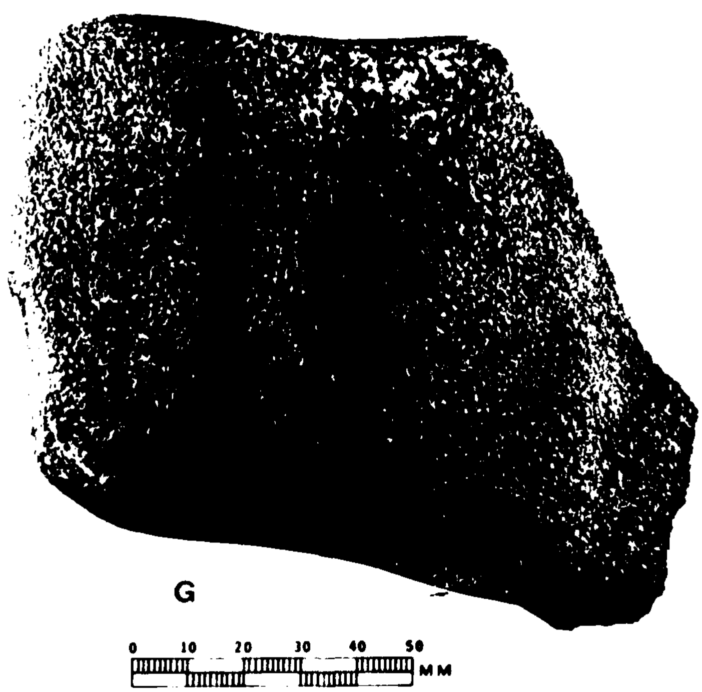
A, B, D, E. Chert flake tools from the Dietrich Dam Site (47 Gt 412): A, grey chert w/alternate lateral retouch; B, unifacial lateral retouch; D, bifacial retouch w/ perforator tip; E, unifacial lateral retouch.

C. Chert blade flake from Dietrich Dam Site (47 Gt 412).

G. Large water-rolled cobble w/polished areas indicative of haft element, possible maul. Dietrich Dam Site (47 Gt 412).

PLATE VI





Key to Plate VII:

A. Chert side-notched projectile point reworked into a drill, Dietrich Dam Site (47 Gt 412).

B. Stemmed projectile point made of heat treated chert, reworked into a drill, (47 Gt 421).

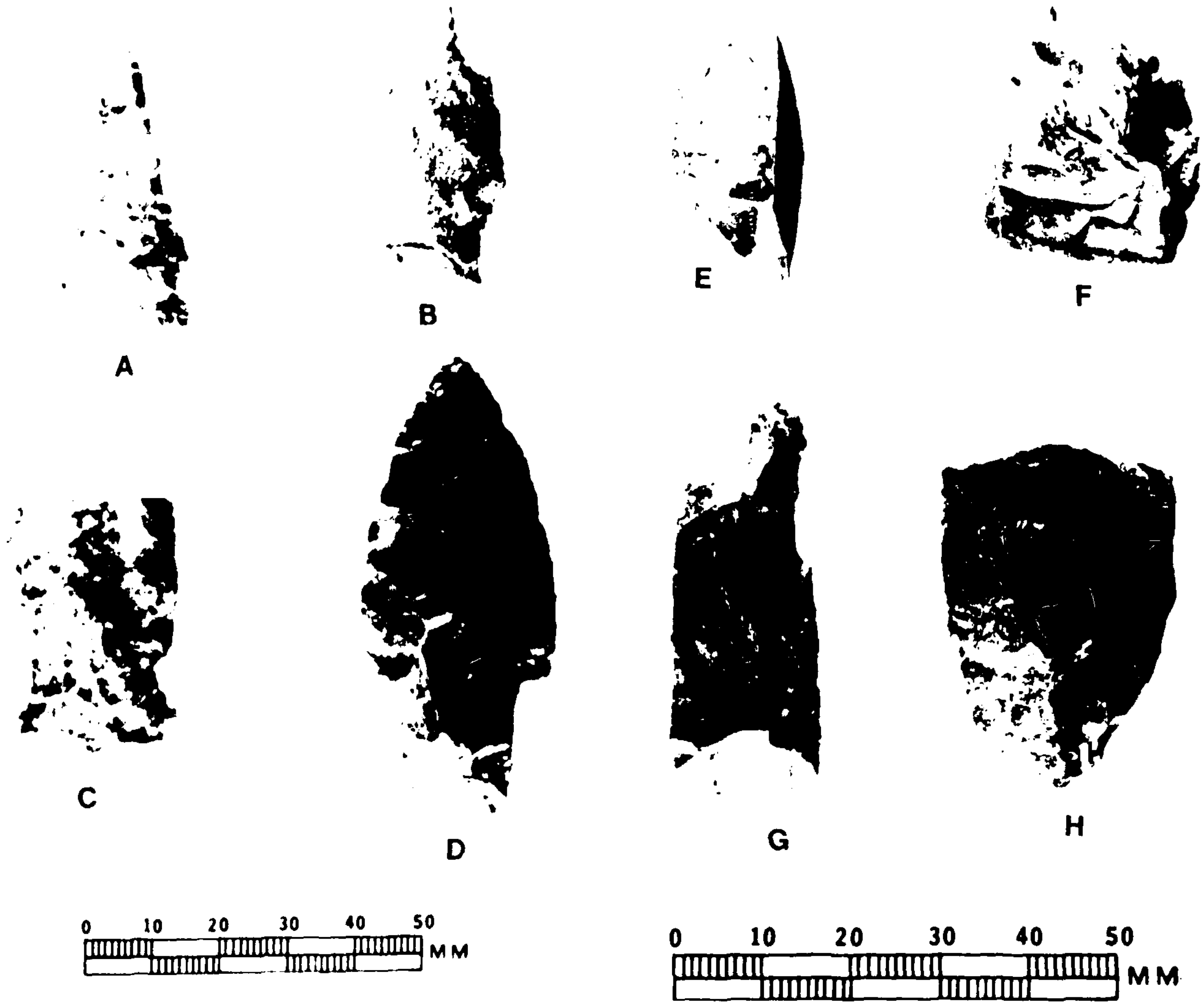
C. Raddatz Side-notched projectile point, chert, Dietrich Dam Site (47 Gt 412).

D. Kramer Point, heat treated chert, Kleinpess Pines Site (47 Gt 417).

E,F. Broken chert bifaces from 47 Gt 416.

G,H. Broken bifaces from the Dietrich Dam Site (47 Gt 412), G appears to be reworked into a perforator.

PLATE VII



Key to Plate VIII:

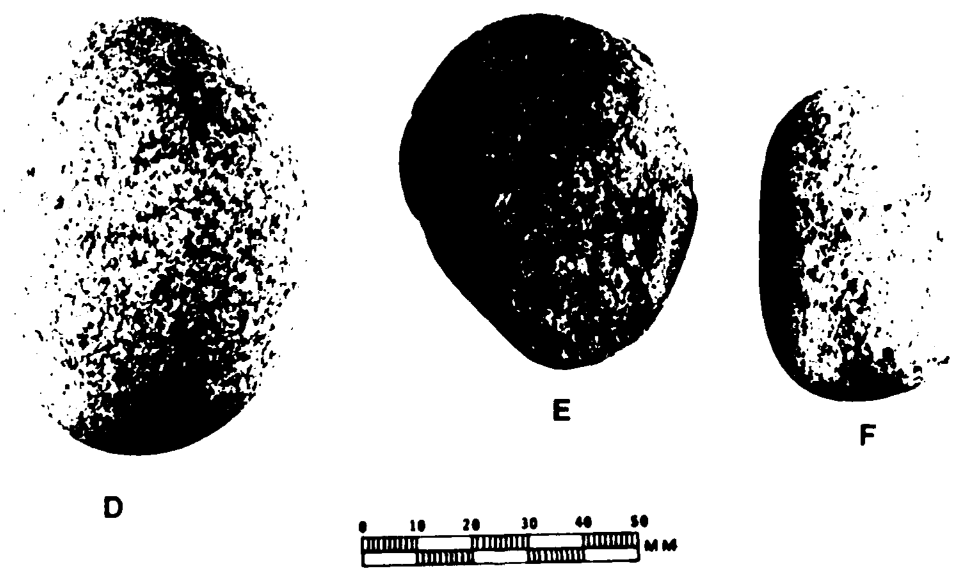
A, B. Large hammerstones from Dietrich Dam Site (47 Gt 412).

C. Hammerstone from the Dewey Creek Site (47 Gt 411).

D. Water-rolled cobble (hammerstone?), Dietrich Dam Site (47 Gt 412).

E,F. Hamerstones, Deitrich Dam Site (47 Gt 412).

PLATE VIII



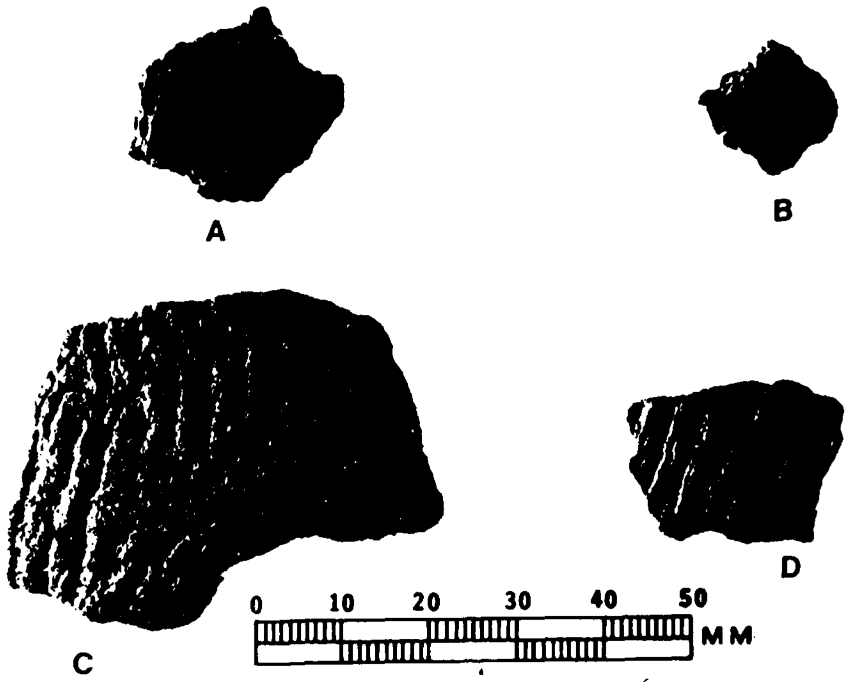
Key to Plate IX:

A. Late Woodland body sherd from Dietrich Dam Site (47 Gt 412).

B. Late Woodland body sherd from Dewey Creek Site (47 Gt 411).

C,D. Sandy Pasted body sherds (Early-Middle Woodland?), Dietrich Dam Site (47 Gt 412).

PLATE IX



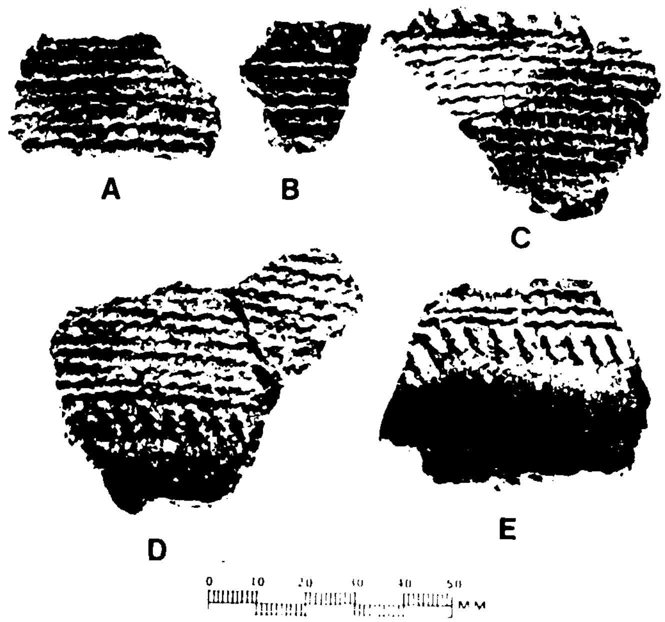
Key to Plate X:

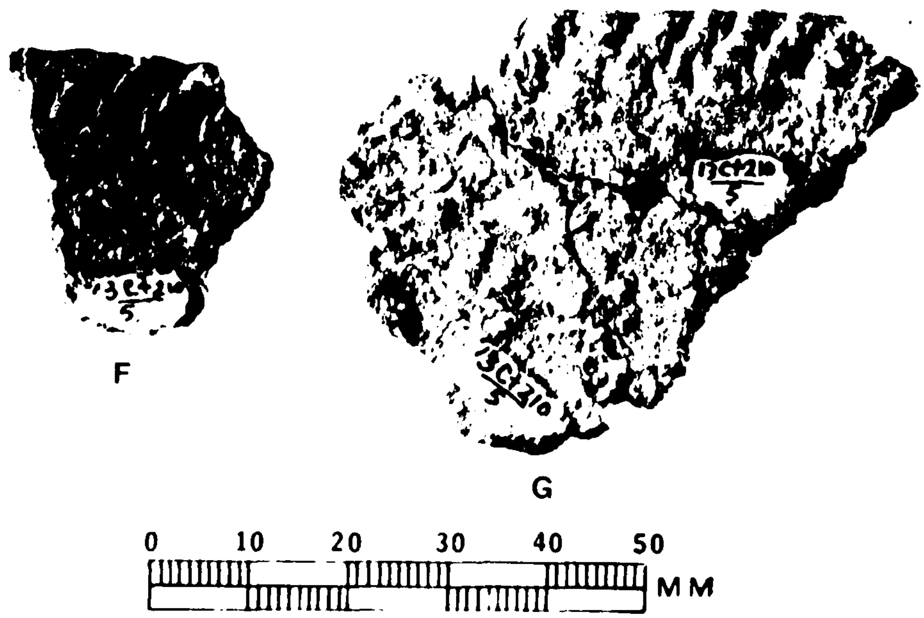
A-E. Rim and neck sherds from a single Late Woodland vessel, Madison Cord Impressed, from Ackerman Cut (13 Ct 210).

F. Interior of "B"

G. Interior of "C"

PLATE X





Key to Plate XI:

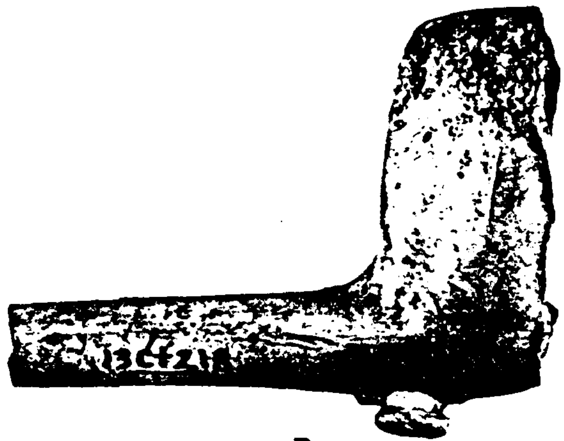
A. Kaolin pipe bowl fragment w/two incised lines, Dietrich Dam Site (47 Gt 412).

B. Broken kaolin pipe (13 Ct 218).

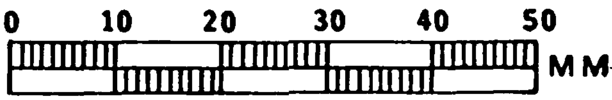
C. Base of stoneware bottle from Dietrich Dam Site (47 Gt 412), inscription reads: " vitreous stone bottles, J. Bourne & Sone, Patentees, Denby Pottery, Near Derby, P. & J. Arnold, London."

PLATE XI

A



B



C

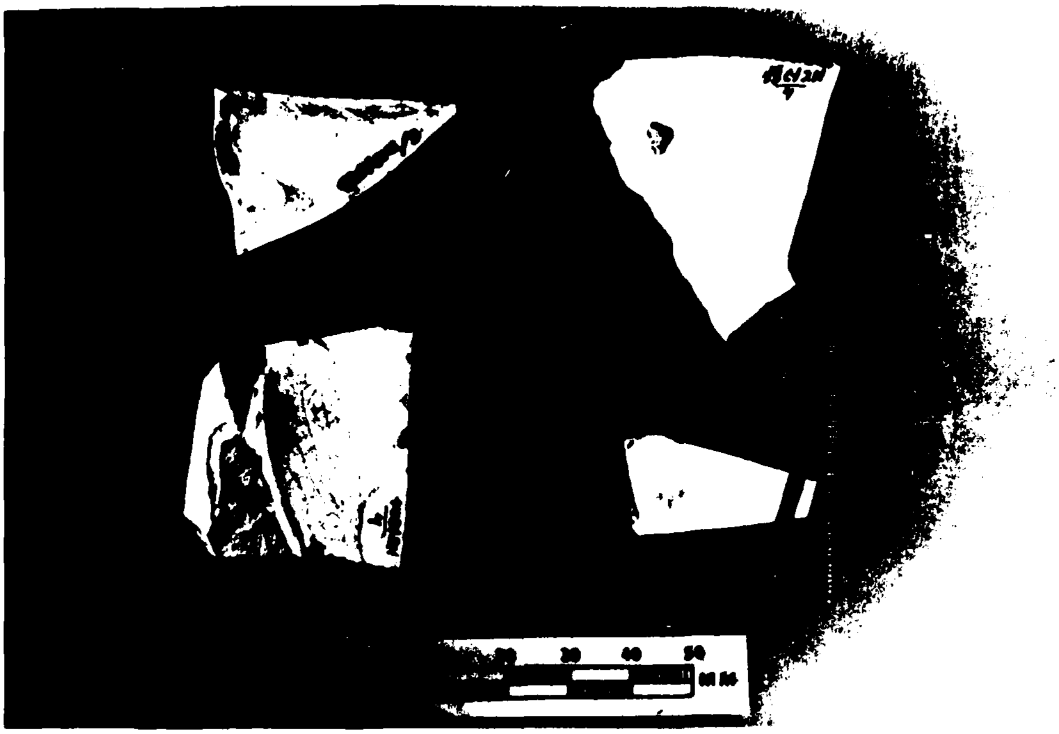
Key to Plate XII:

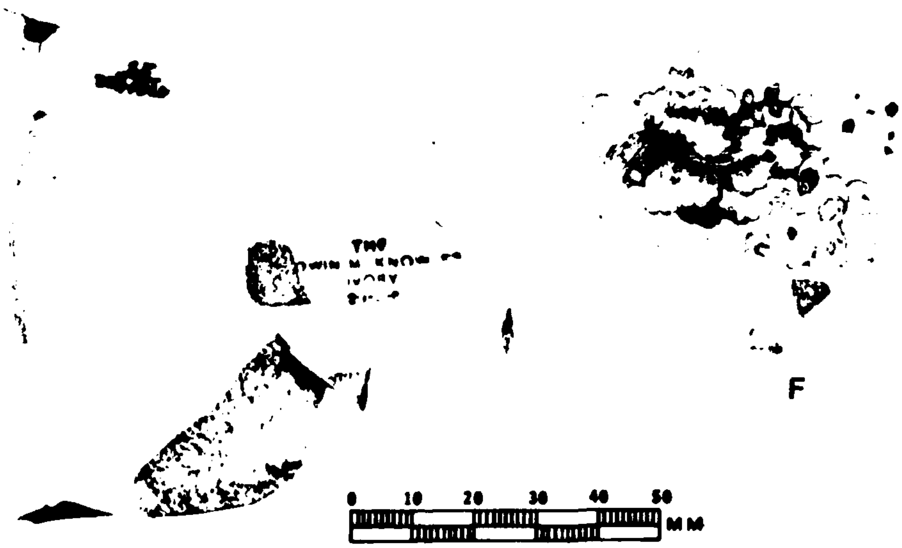
A. White earthenware sherd from Dietrich Dam Site (47 Gt 412).

B-D. White earthenware sherds from Dewey Creek Site, (47 Gt 411).

E-F. Sherds from a single white earthenware plate (47 Gt 422); E reads "The ...Owin M. Knowles, Ivory 29-2-8."

PLATE XII





Key to Plate XIII:

A. Yellow glazed stoneware rimsherd from 13 Ct 213.

B,C. Dark brown stoneware sherds from 47 Gt 421.

D. Water-rolled clay brick from Fiddler's Point (13 Ct 213).

E. Lightly water-rolled clay brick fragment, 13 Ct 220.

PLATE XIII

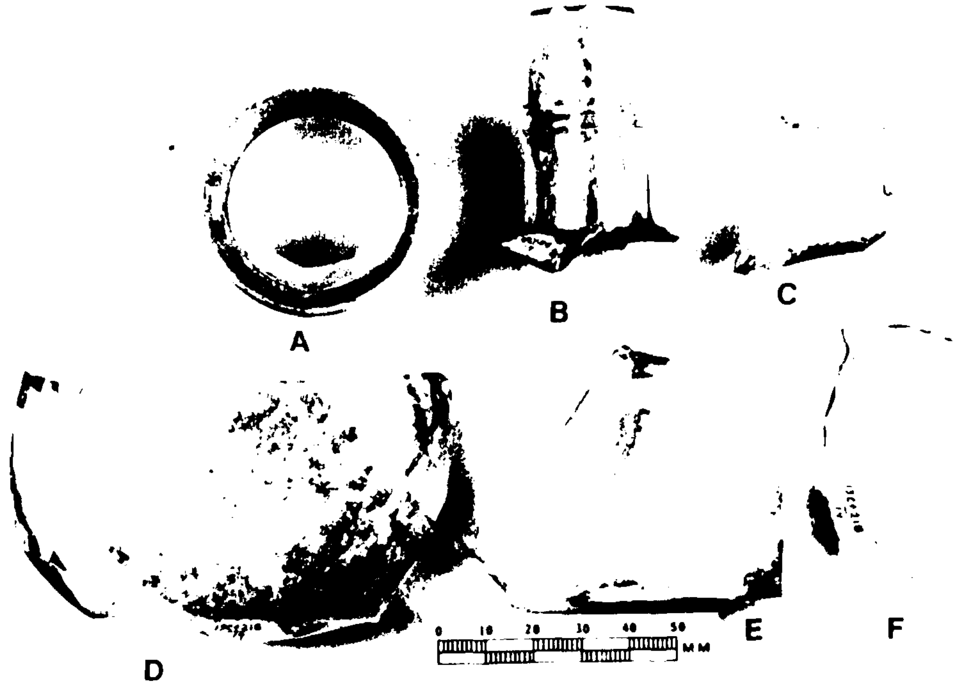
Key to Plate XIV:

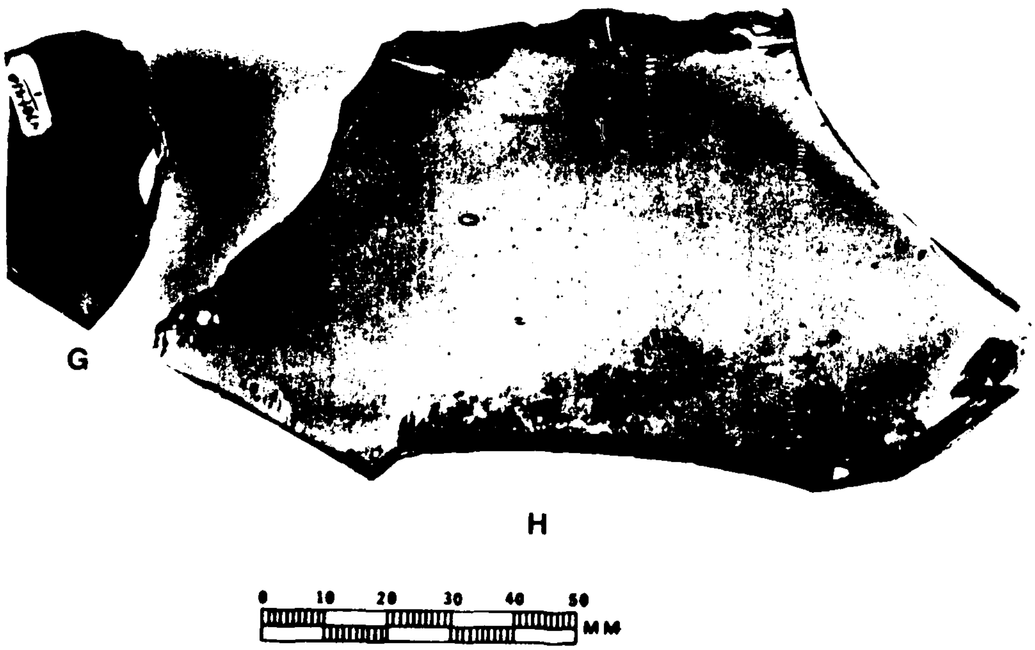
A-F. Glass bottle fragments from 13 Ct 218.

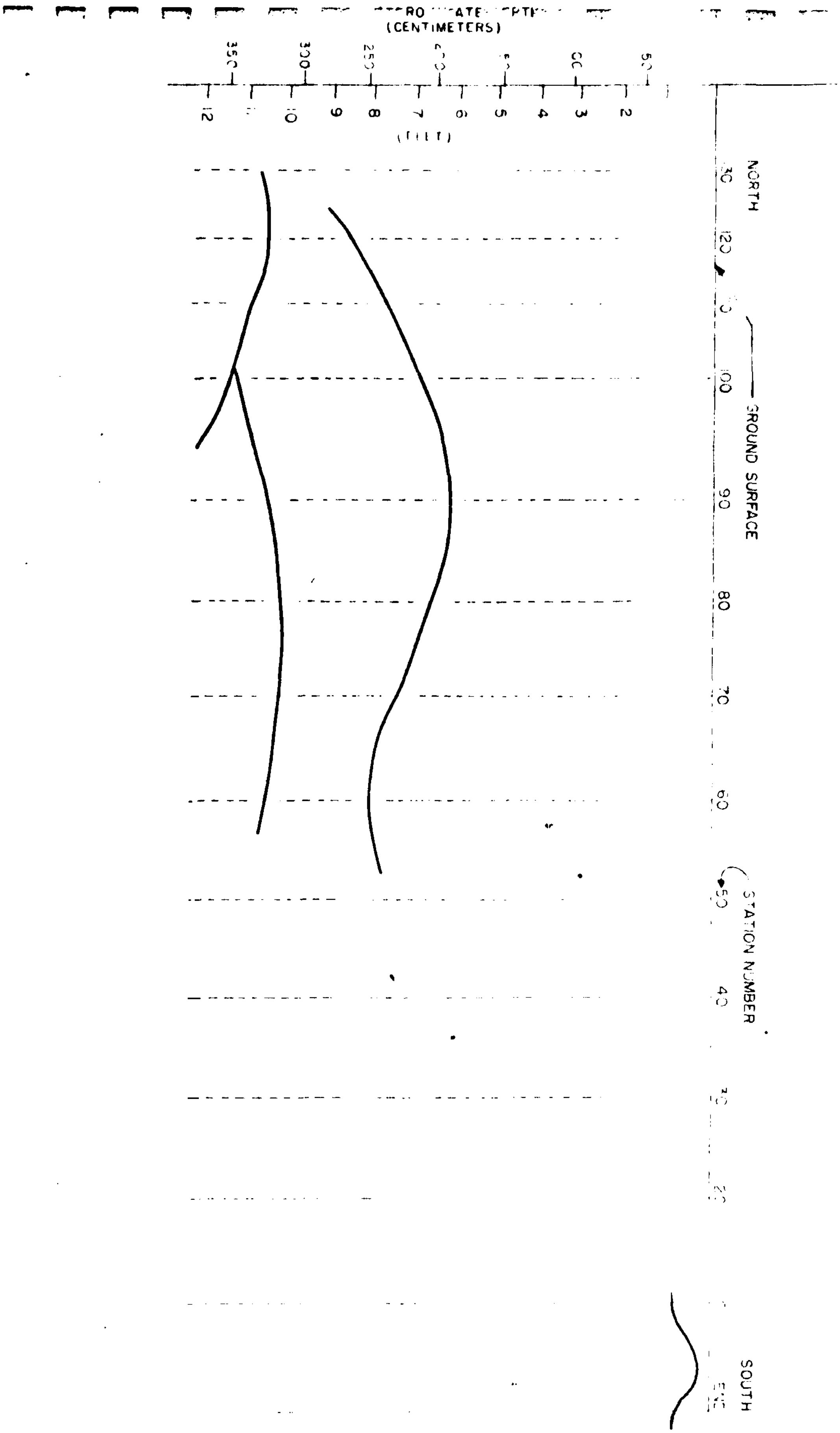
G. Blue glass bottle fragment from 47 Gt 410.

H. Blue-green glas bottle fragment from Dietrich Dam Site (47 Gt 412).

PLATE XIV







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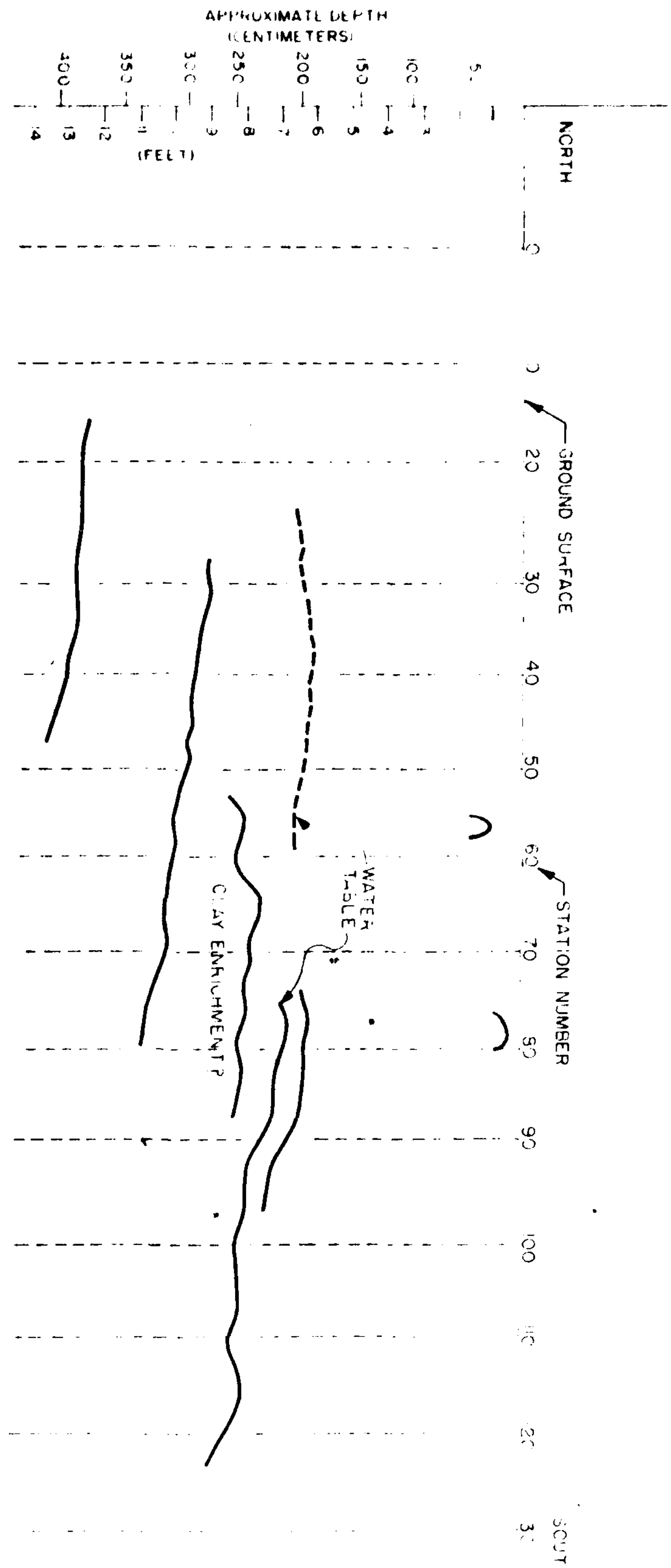
RADAR PROFILE DEPICTING MAJOR SUBSURFACE ANOMALIES

ALONG RUN 1, JACK OAK ISLAND

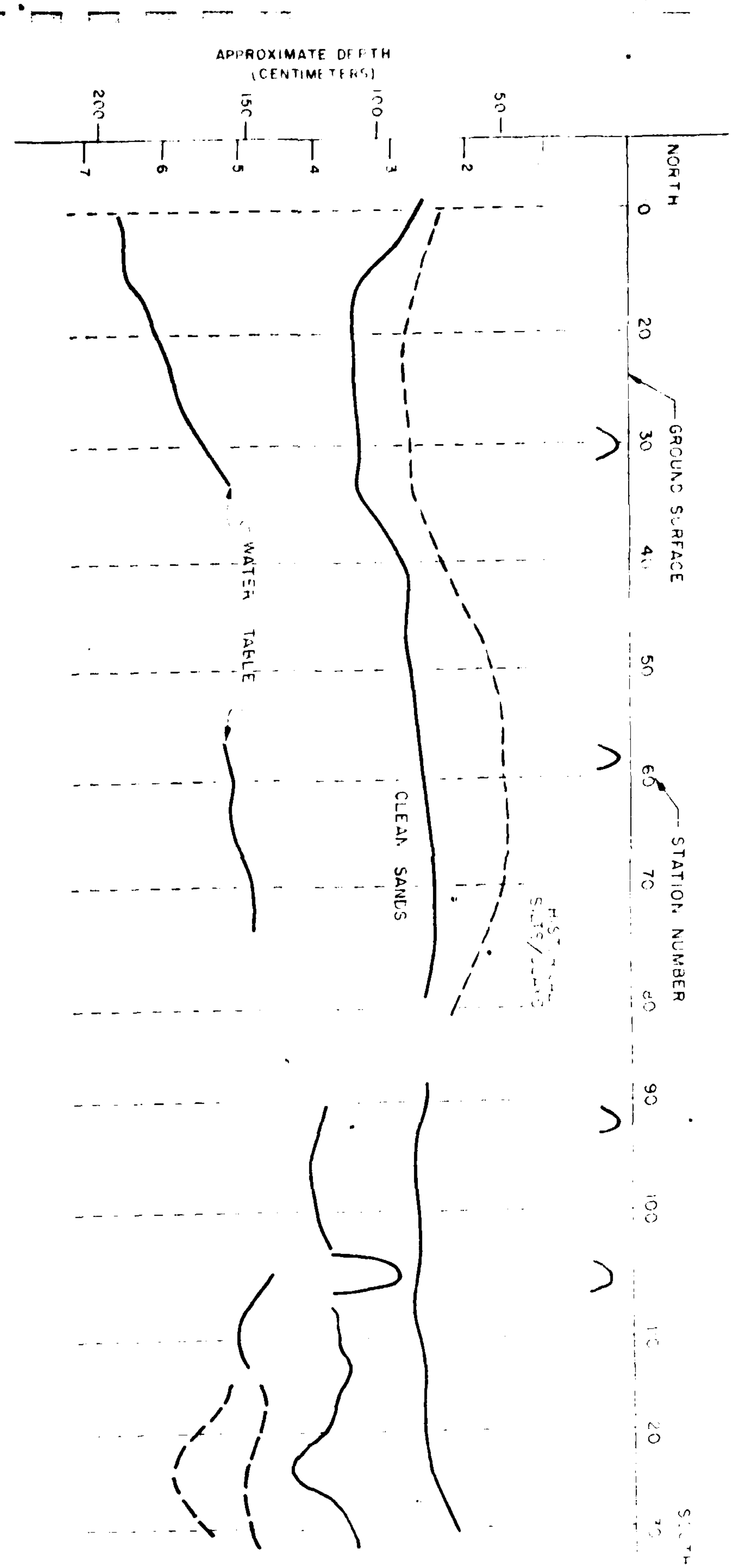
MISSISSIPPI RIVER, POOL II



Donohue RADAR PROFILE DEPICTING MAJOR SUBSURFACE ANOMALIES

ALONG RUN 2, JACK OAK ISLAND

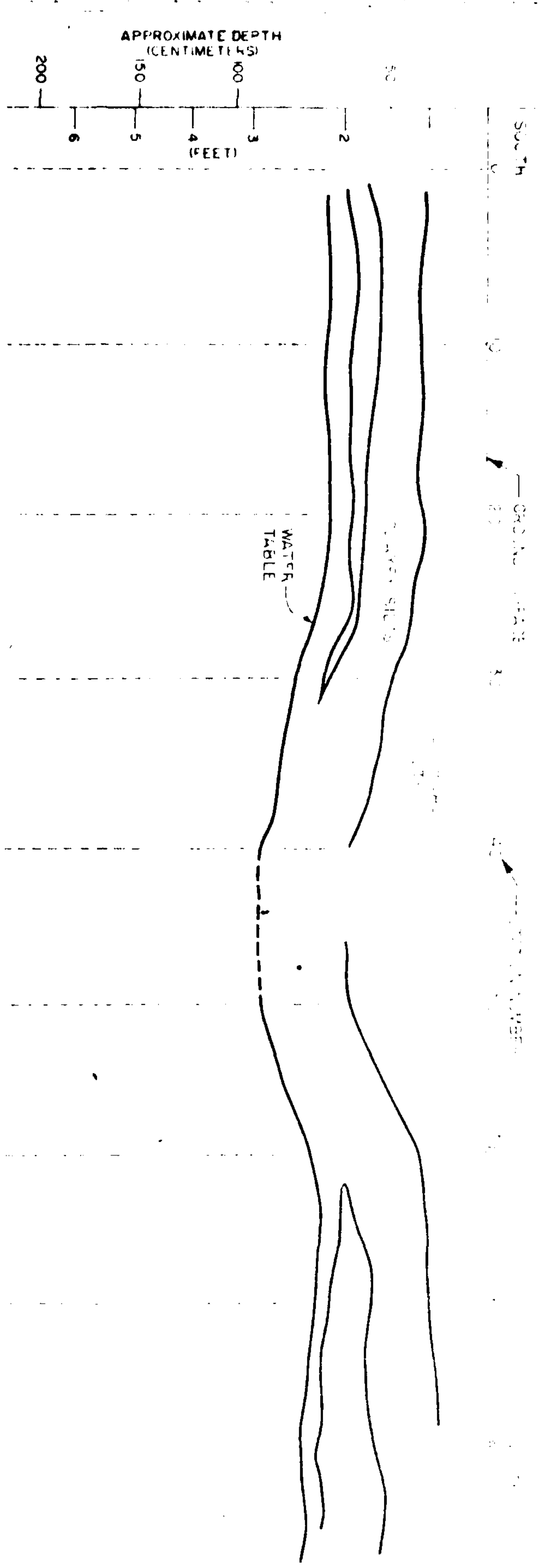
MISSISSIPPI RIVER, POOL II



Donohue RADAR PROFILE DEPICTING MAJOR SUBSURFACE ANOMALIES

ALONG RUN 3, JACK OAK ISLAND

MISSISSIPPI RIVER, POOL II



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RADAR PROFILE DEPICTING MAJOR SUBSURFACE ANOMALIES

ALONG RUN 4 JACK OAK ISLAND

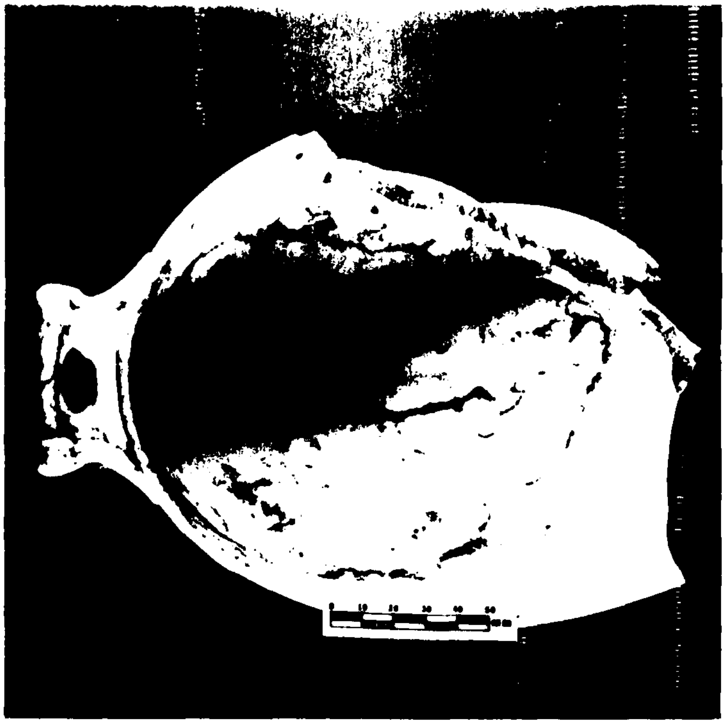
MISSISSIPPI RIVER, POOL 11

Key to Plate XV:

A. White chinaware serving dish, 13 Ct 221.

B. Basal fragment of large blue-green glass bottle, 47 Gt 420 (1923 date?).

PLATE XV



B

Key to Plate XVI:

A-C. Shell button blanks, Fiddler's Point (13Ct 213).

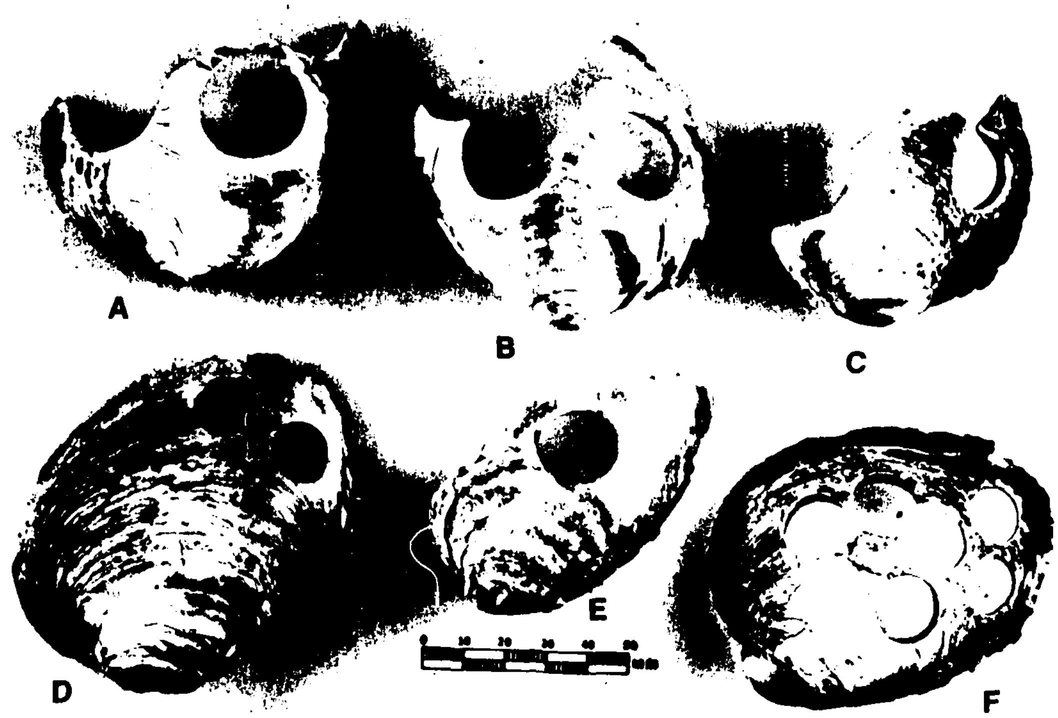
D-F. Shell button blanks, 13 Ct 218.

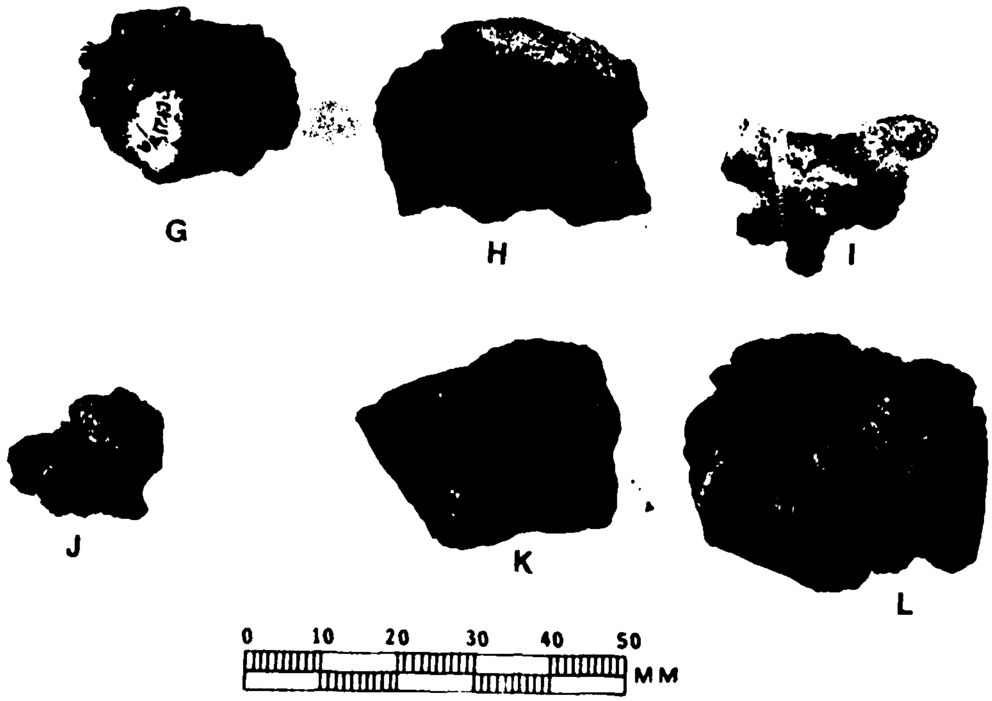
G-J. Coal clinkers from 13 Ct 215.

K. Coal from 13 Ct 215.

L. Glass slag (?) from 47 Gt 421.

PLATE XVI





Key to Plate XVII:

A. Silver cigarette case with missing cover, 47 Gt 420.

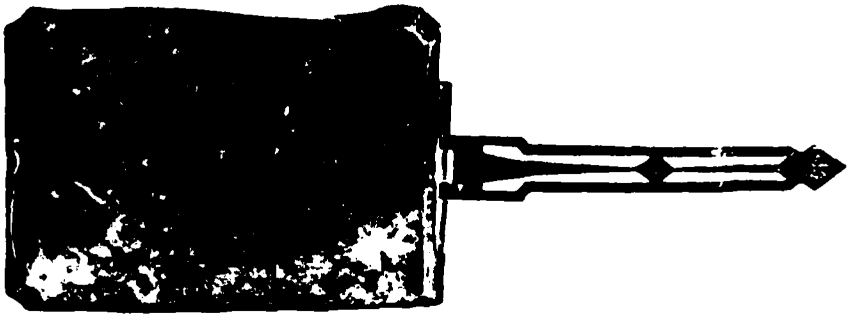
B. Buckle from 13 Ct 218.

C. Silver "pendant" from Dewey Creek Site (47 Gt 411).

D. Enameled agate ironware tea kettle fragment (13 Ct 220).

E. Unidentified iron "bar" (13 Ct 211).

PLATE XVII

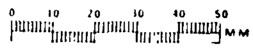


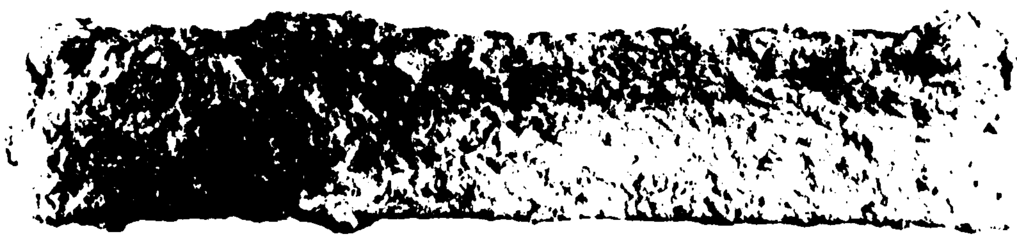
A

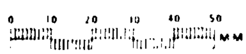
B

C

D







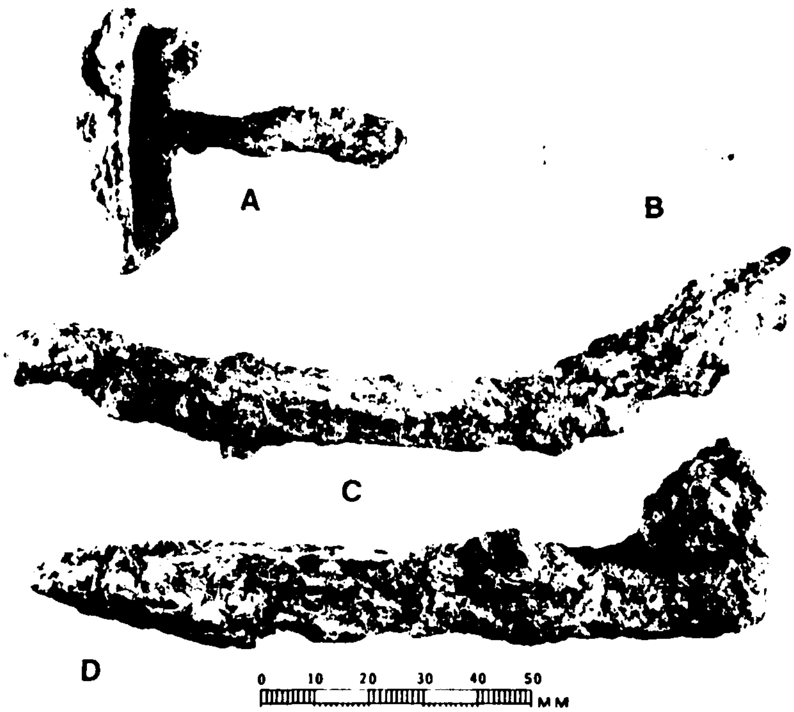
E

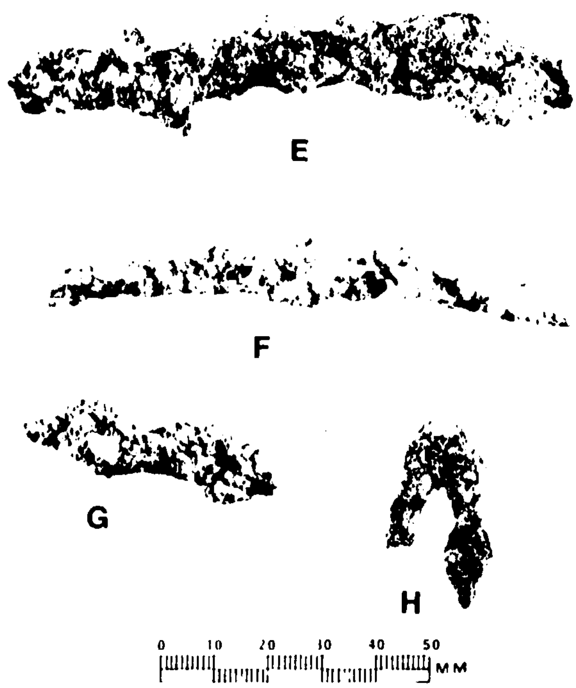
Key to Plate XVIII:

Various historic items from 13 Ct 211:

A. stovetop fragment; B. lead net weight; C. unidentified iron fragment; D. railroad spike (trot line weight?); E-G, rust encrusted barbed-wire fragments; H. wire staple.

PLATE XVIII





Key to Plate XIX:

A. Barrel strap fragment from the Dewey Creek Site (47 Gt 411).

B. Square Nails , one clinched (47 Gt 410).

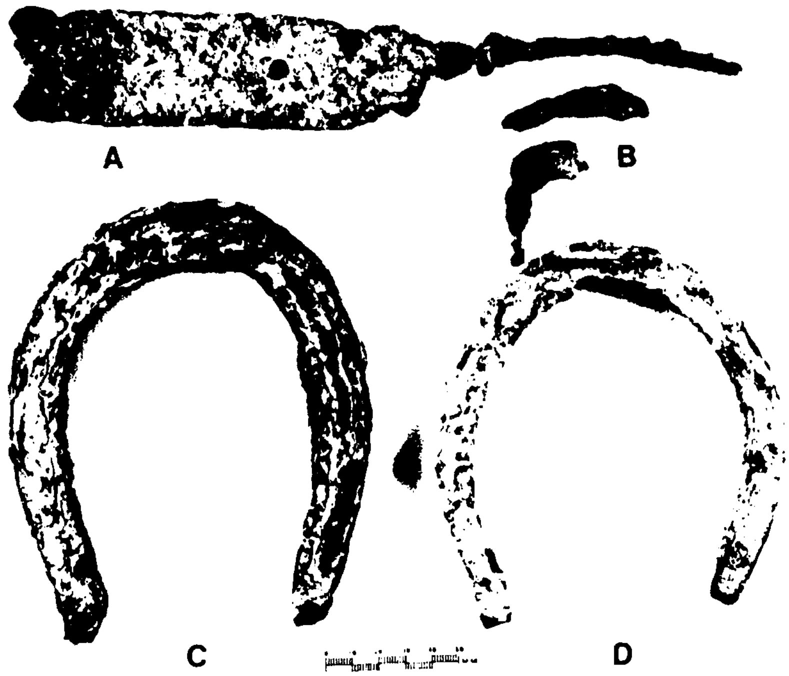
C. Horseshoe from Fiddler's Point (13 Ct 213).

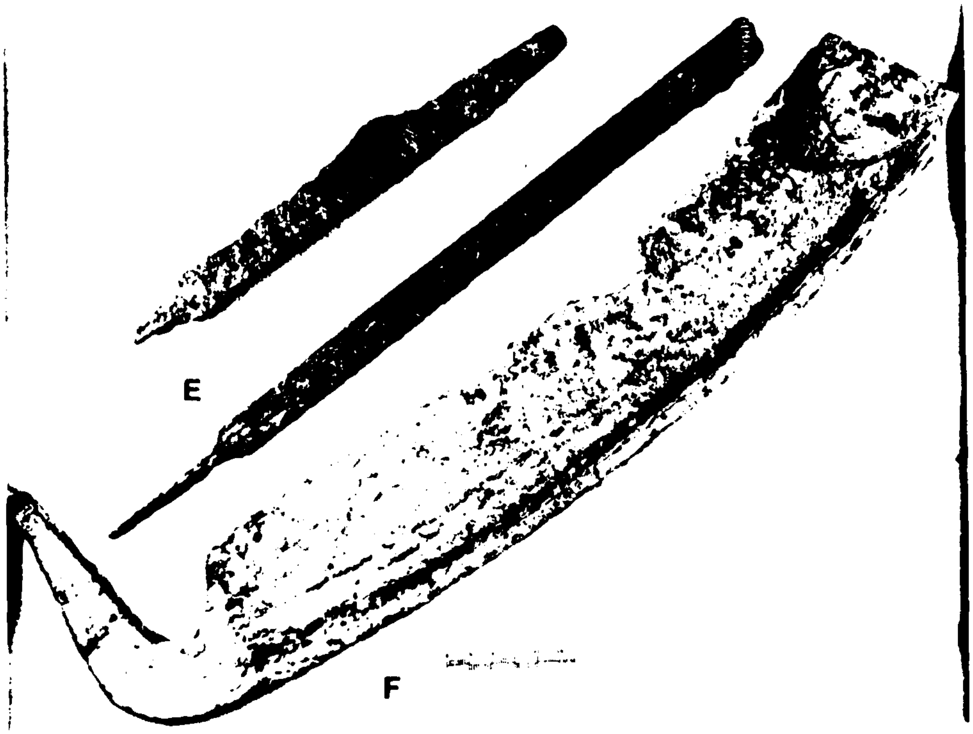
D. Horseshoe from Dietrich Dam Site (47 Gt 412).

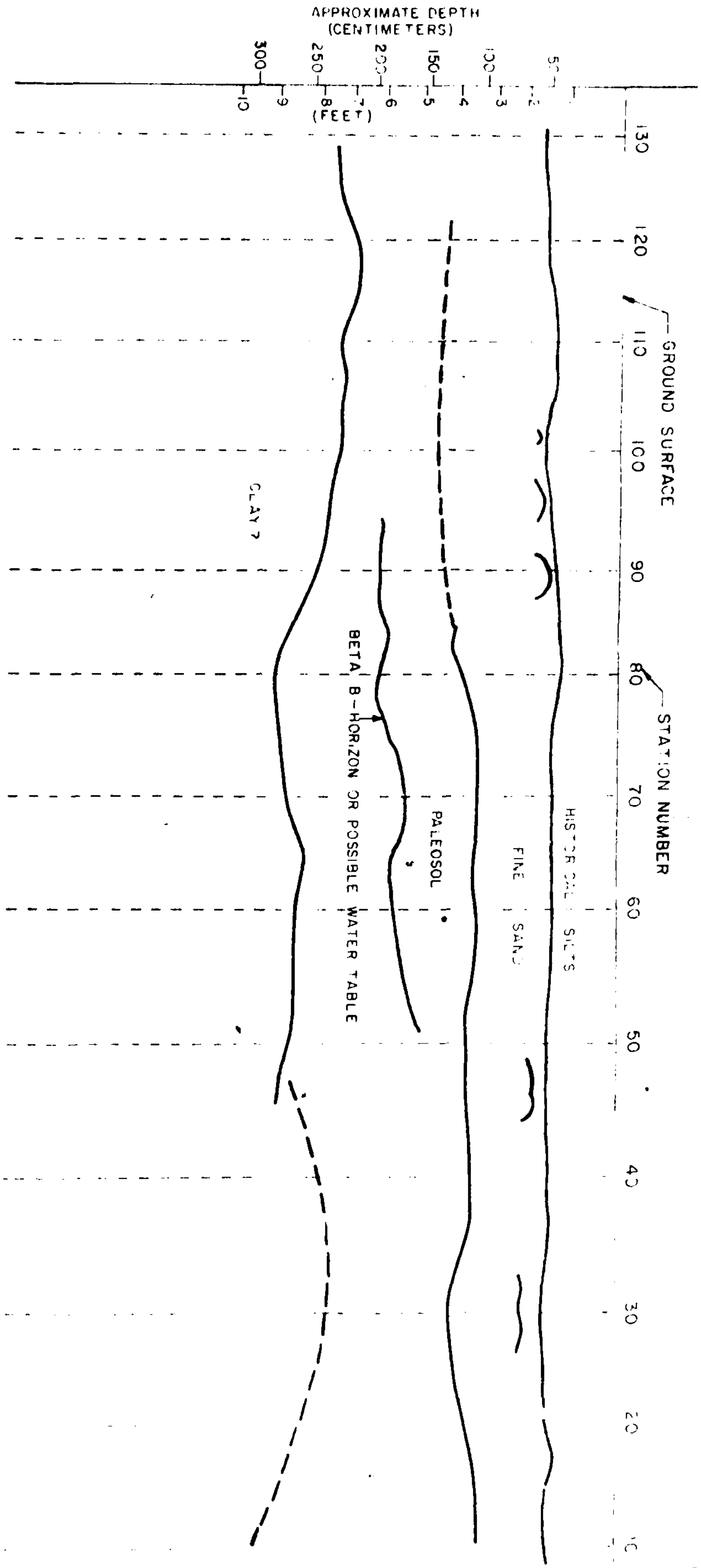
E. Two bastard files from Fiddler's Point (13 Ct 213).

F. Scythe blade, Fiddler's Point (13 Ct 213).

PLATE XIX







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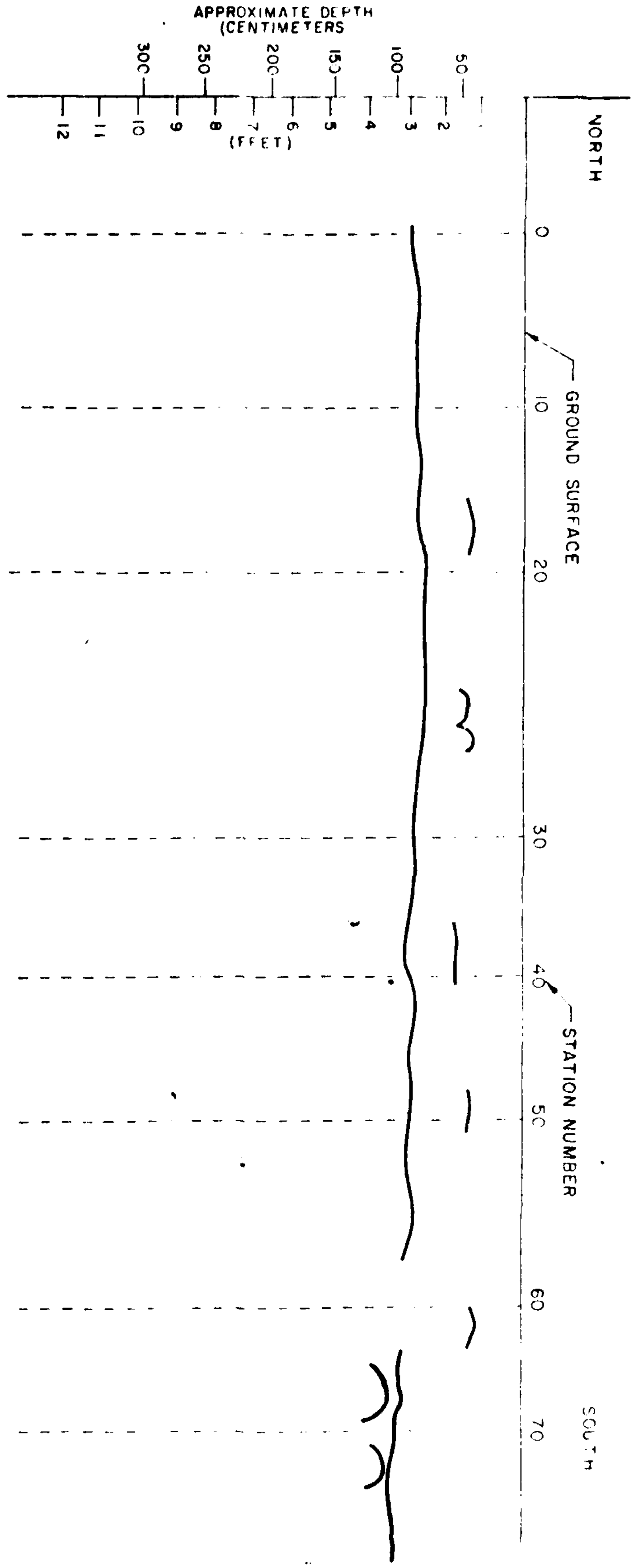
RADAR PROFILE DEPICTING MAJOR SUBSURFACE ANOMALIES

ALONG RUN 1, JACK OAK SLOUGH

MISSISSIPPI RIVER, POOL II



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RADAR PROFILE DEPICTING MAJOR SUBSURFACE ANOMALIES

ALONG RUN 2, JACK OAK SLOUGH

MISSISSIPPI RIVER, POOL II

FIGURE 11